

Figure 1

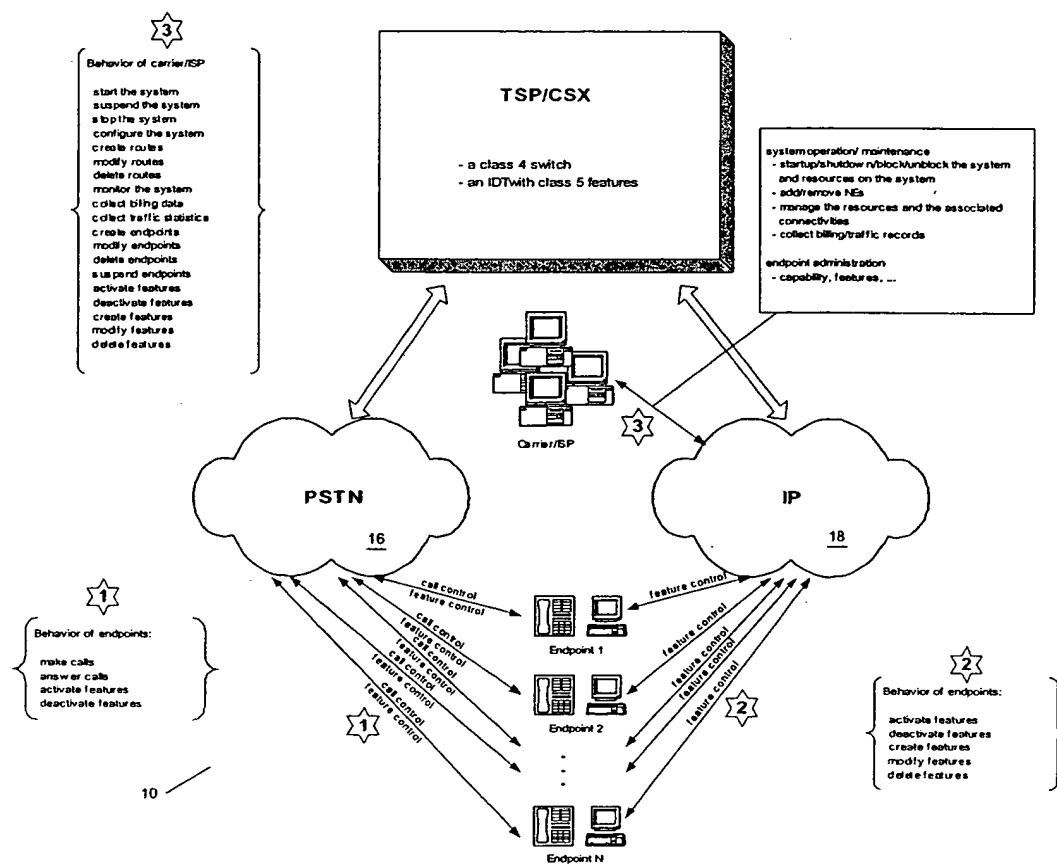


Figure 2

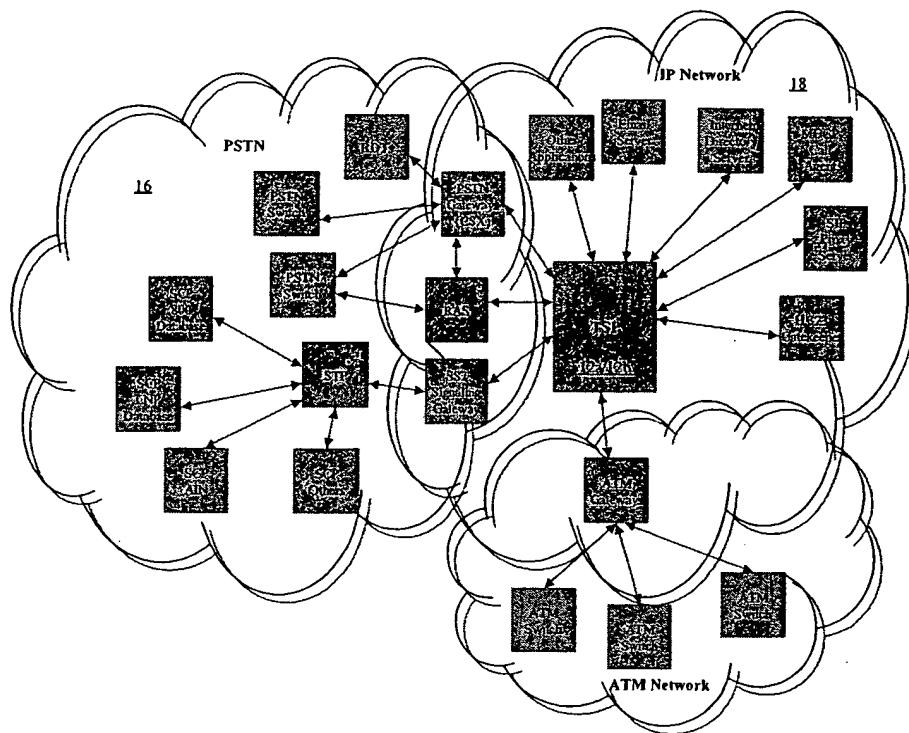


Figure 3

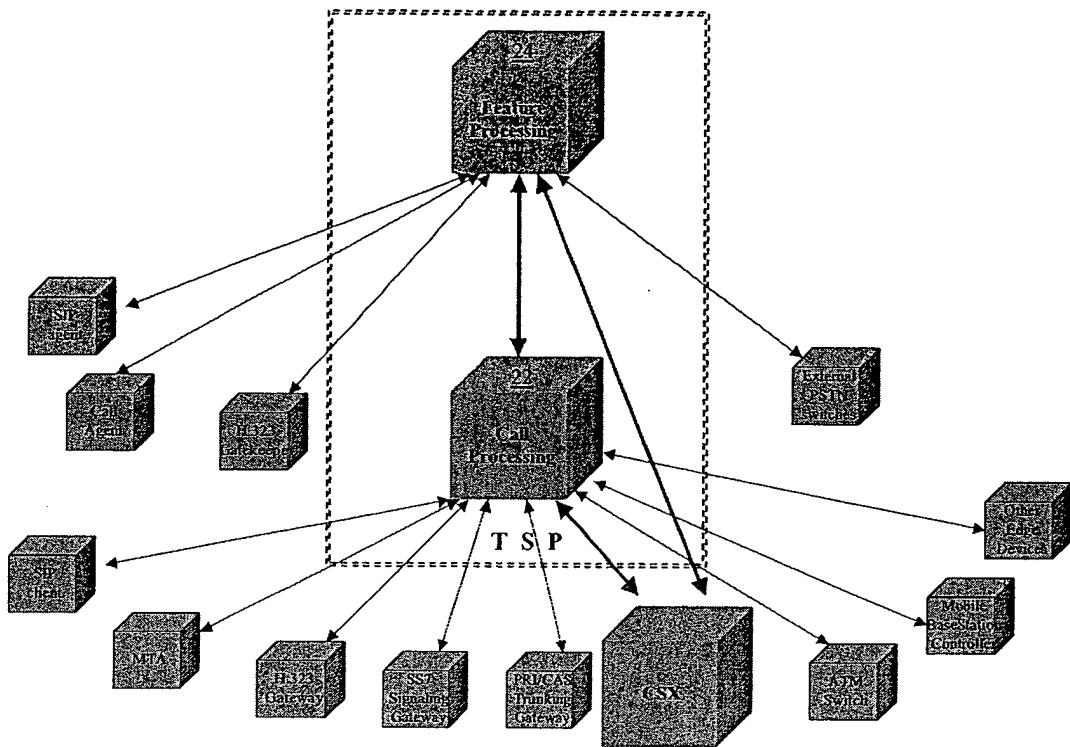


Figure 4

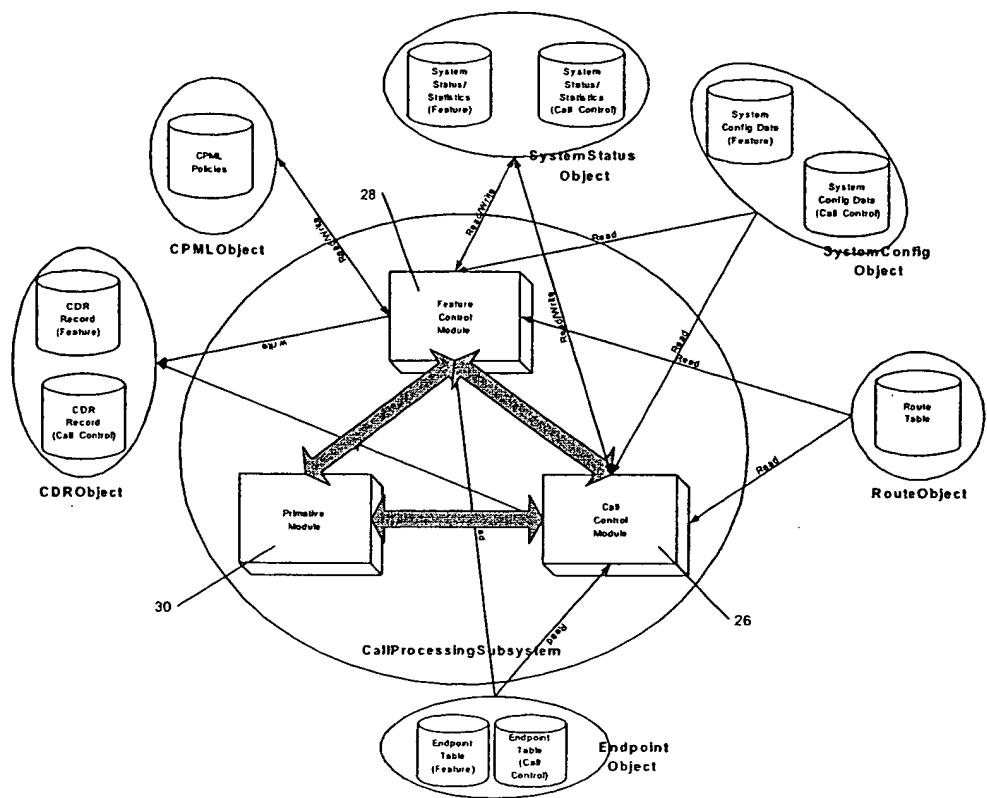


Figure 5

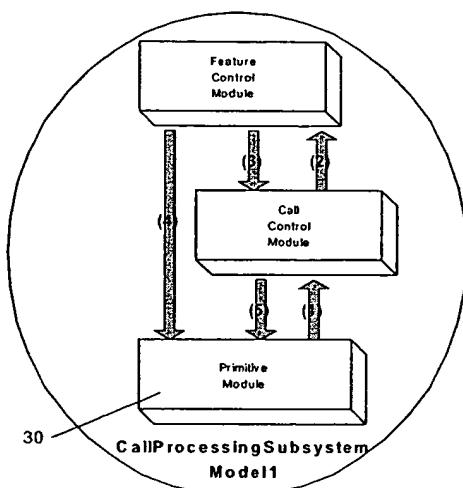


Figure 6A

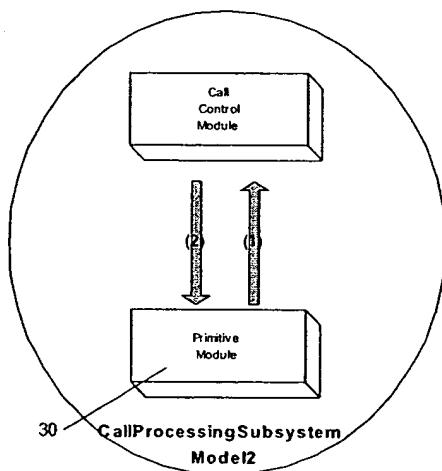


Figure 6B

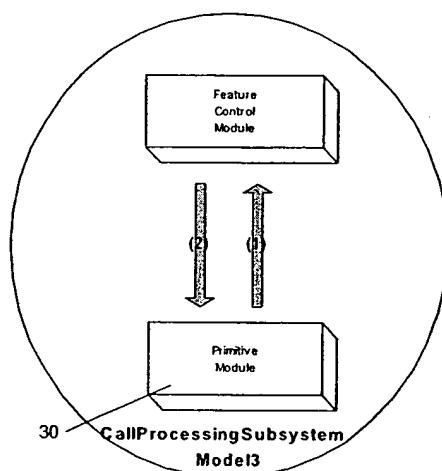
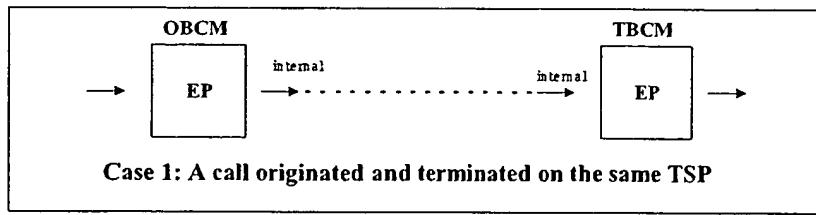
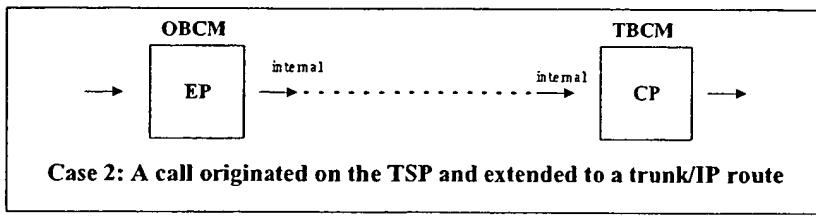


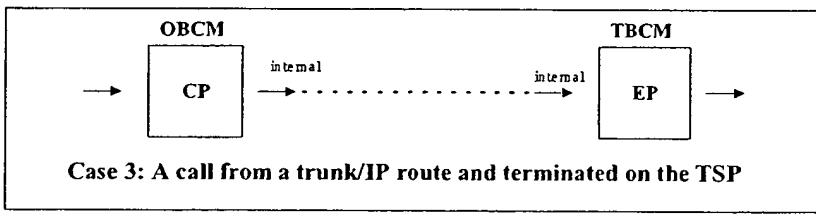
Figure 6C



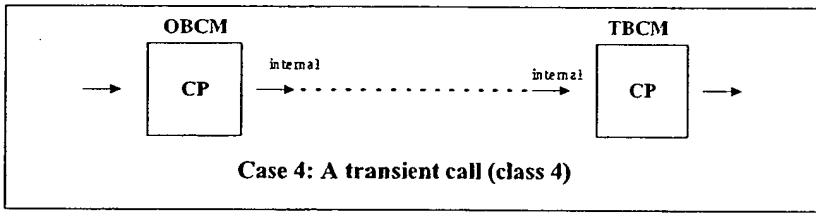
**Figure 7A**



**Figure 7B**



**Figure 7C**



**Figure 7D**

Feature Mask	Feature Logic Object
000	NULL
001	CND_FLO
010	CFBL_FLO
011	CFBL_FLO
100	CW_FLO
101	CW_CND_FLO
110	CW_CFBL_FLO
111	CW_CFBL_CND_FLO

30A

feature mask = abc where

bit a – Call Waiting (CW)

bit b – Call Forwarding Busy Line (CFBL)

bit c – Calling Number Delivery (CND)

**User defined features are not included in this table.****Figure 8**

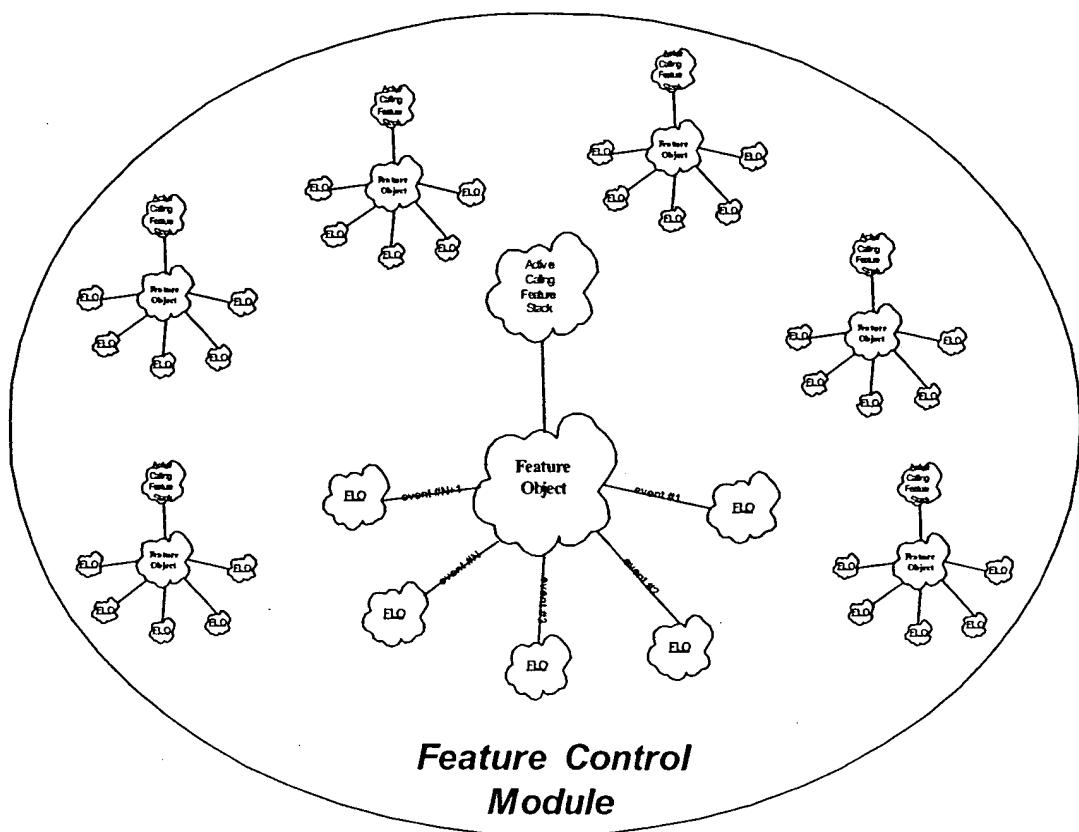


Figure 9

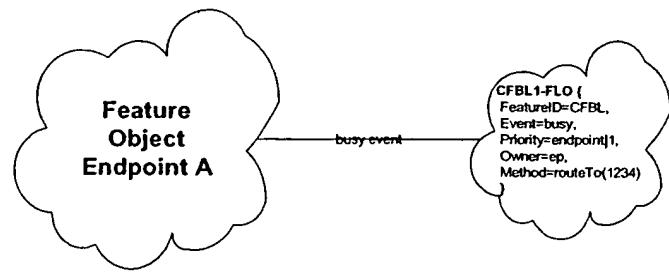


Figure 10A

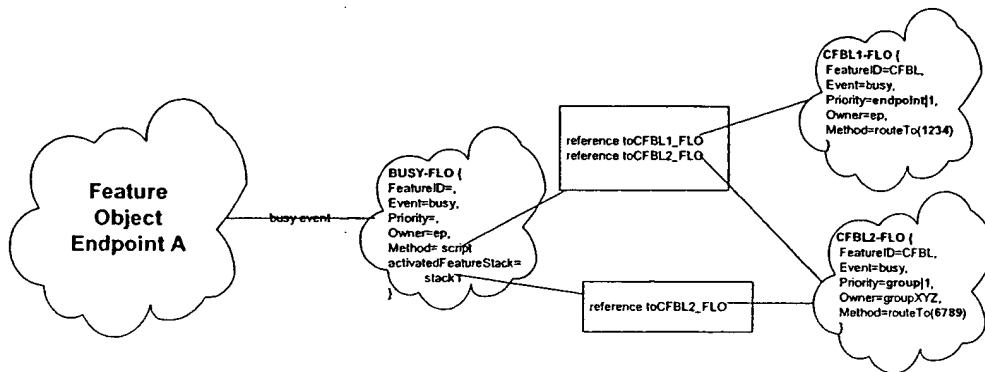


Figure 10B

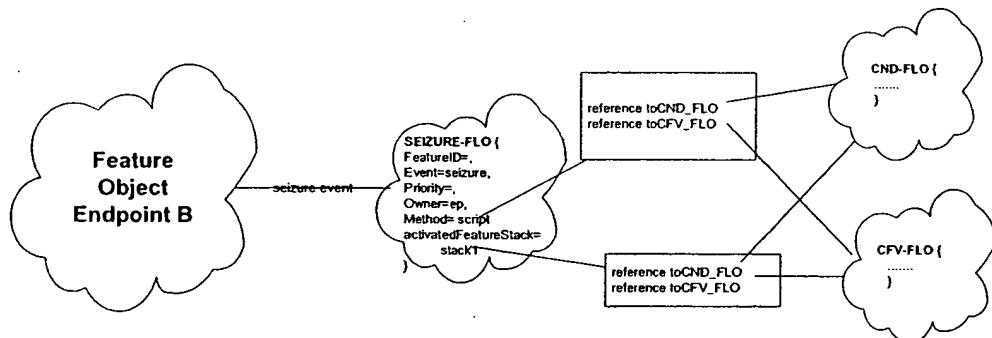
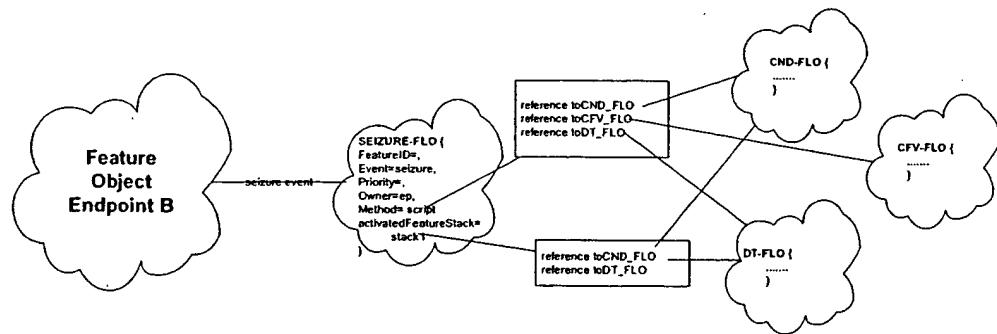
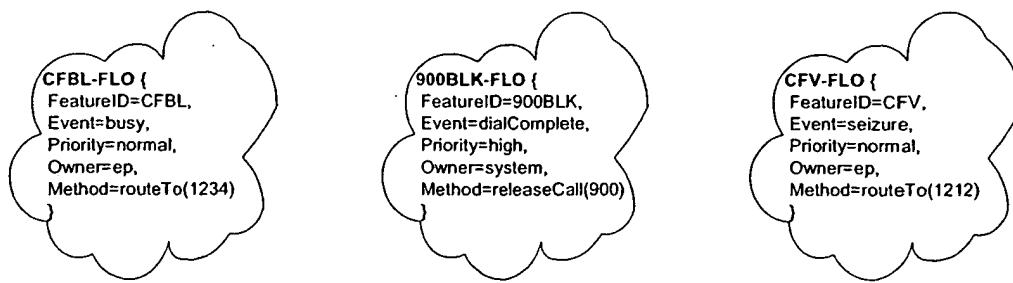
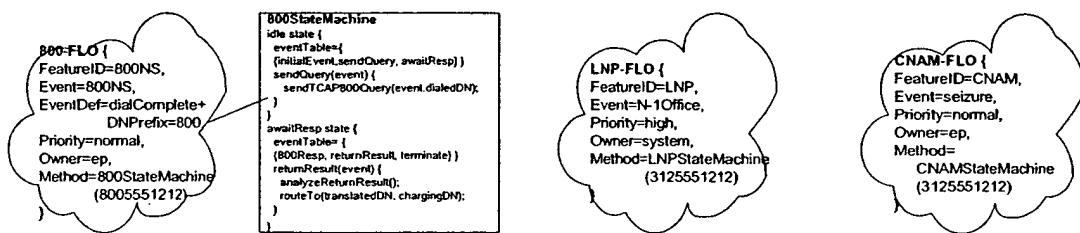
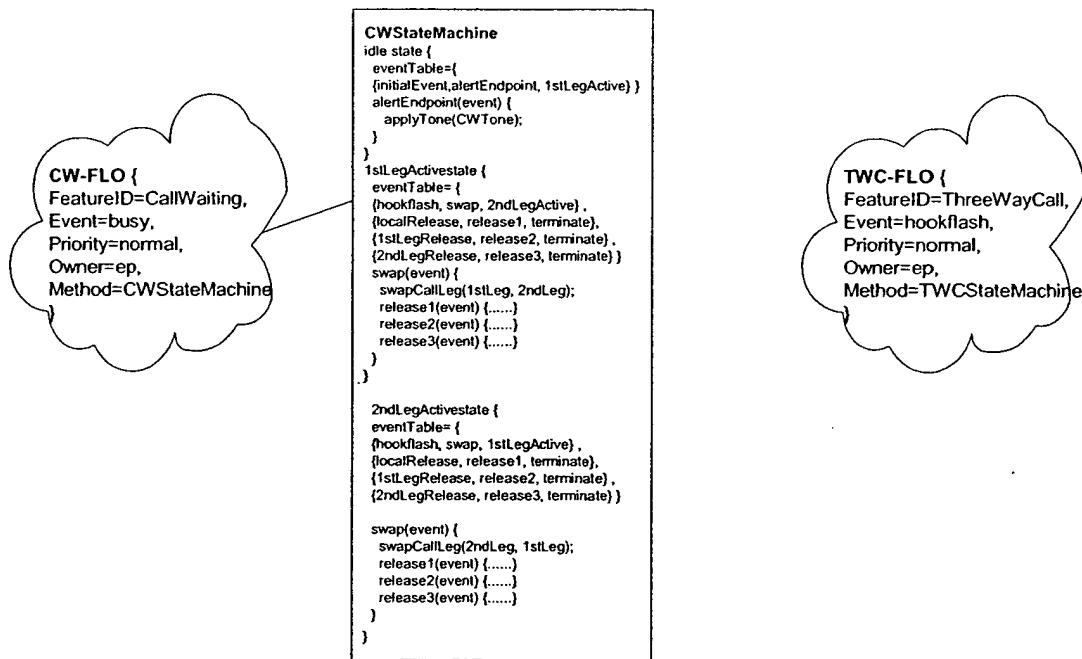


Figure 10C



**Figure 10D**

**Figure 11A****Figure 11B****Figure 11C**

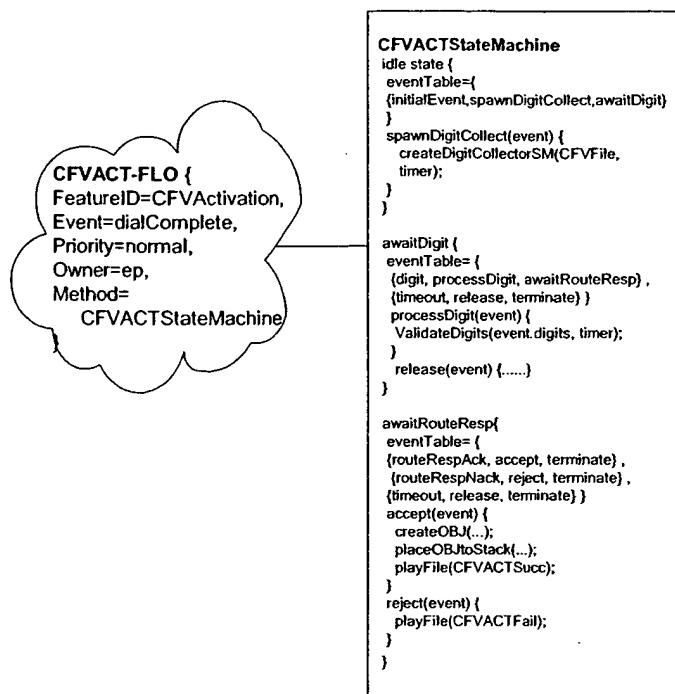


Figure 11D

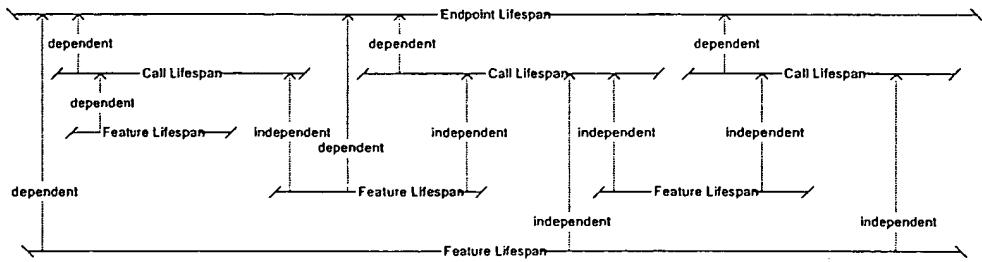


Figure 12

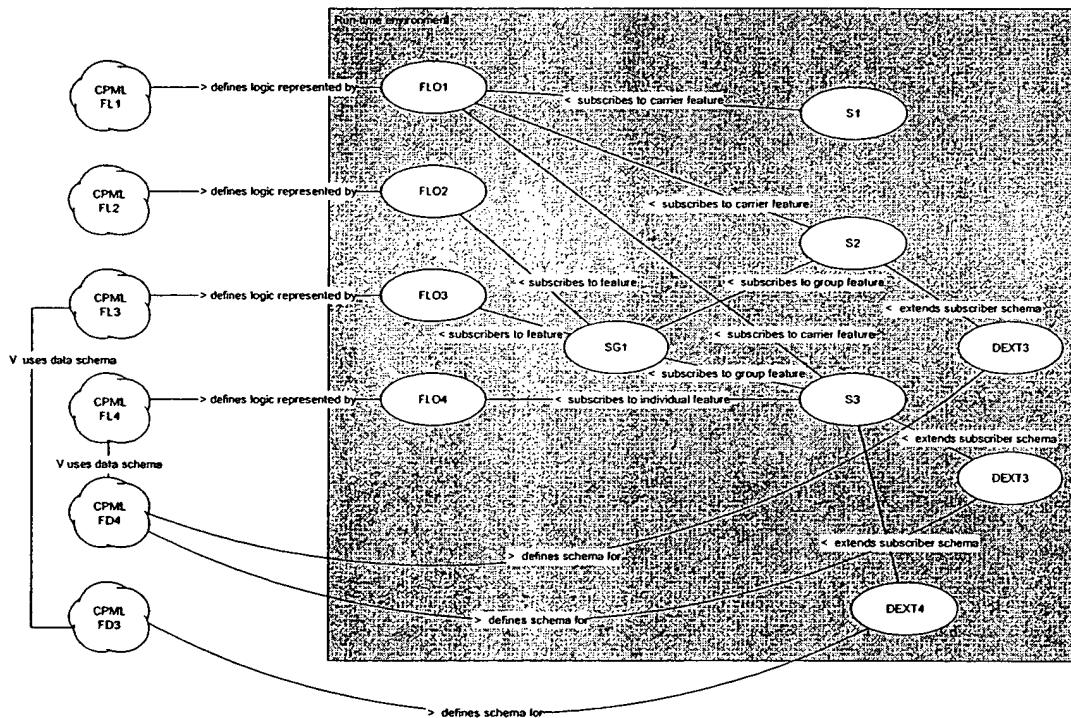


Figure 13

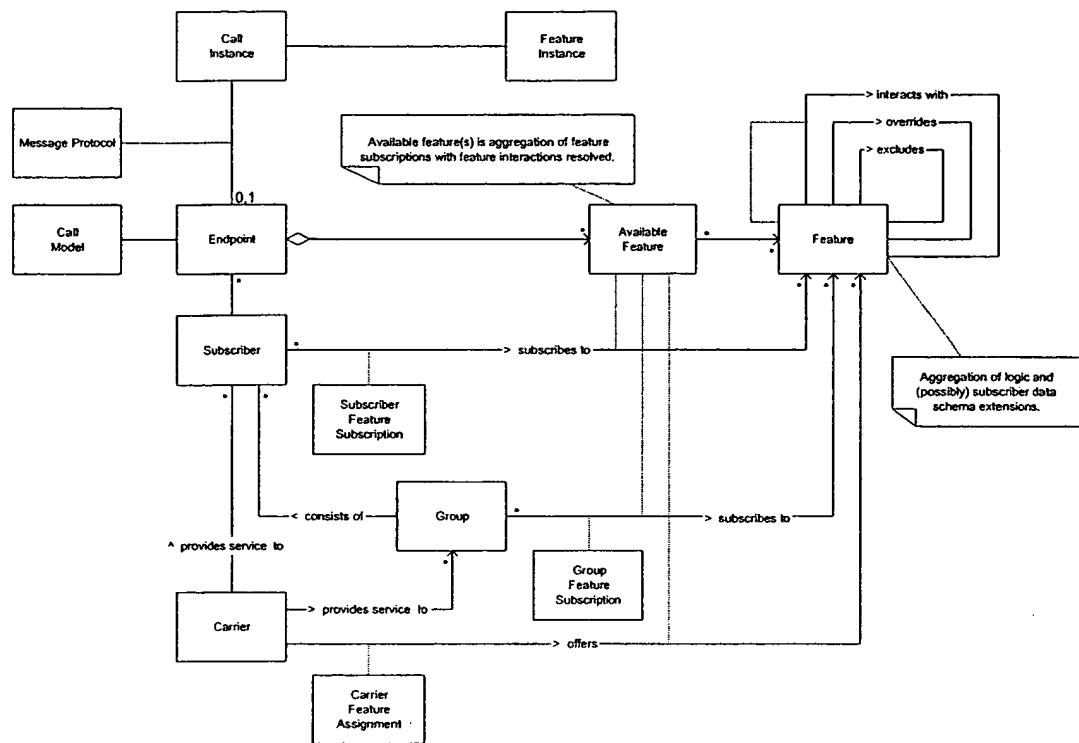
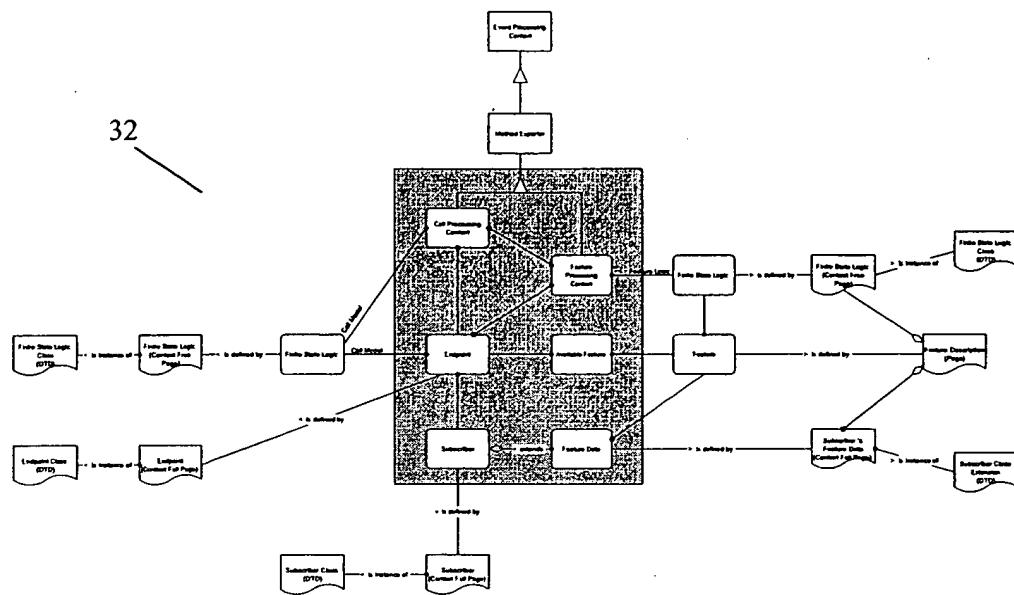


Figure 14

32



**Figure 15**

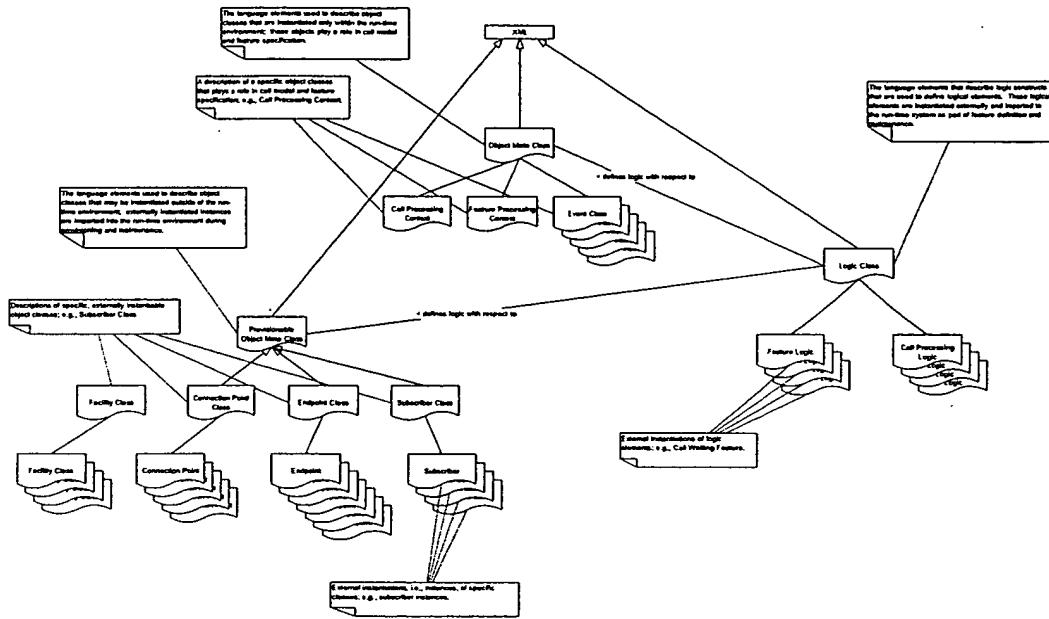


Figure 16

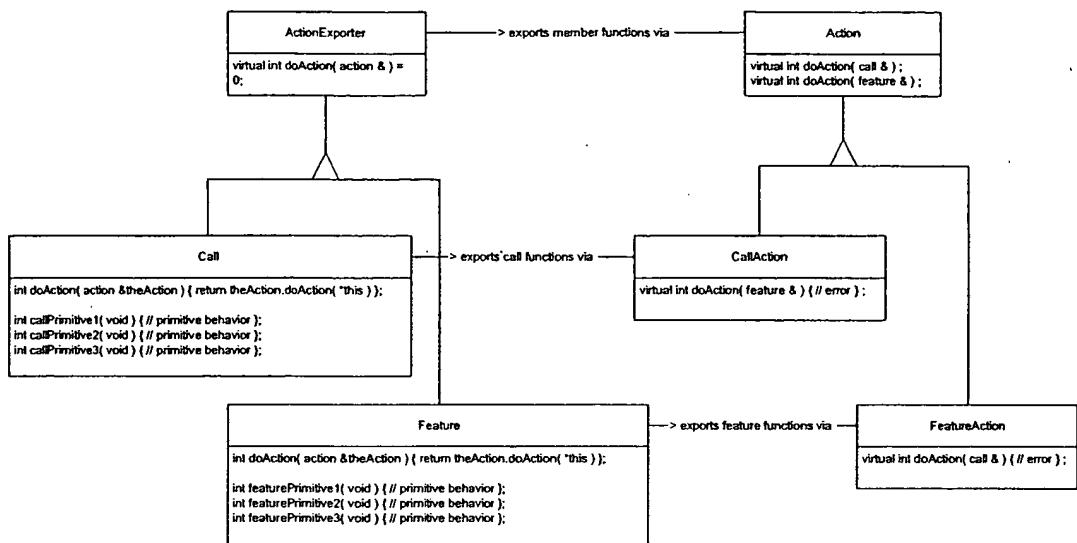


Figure 17

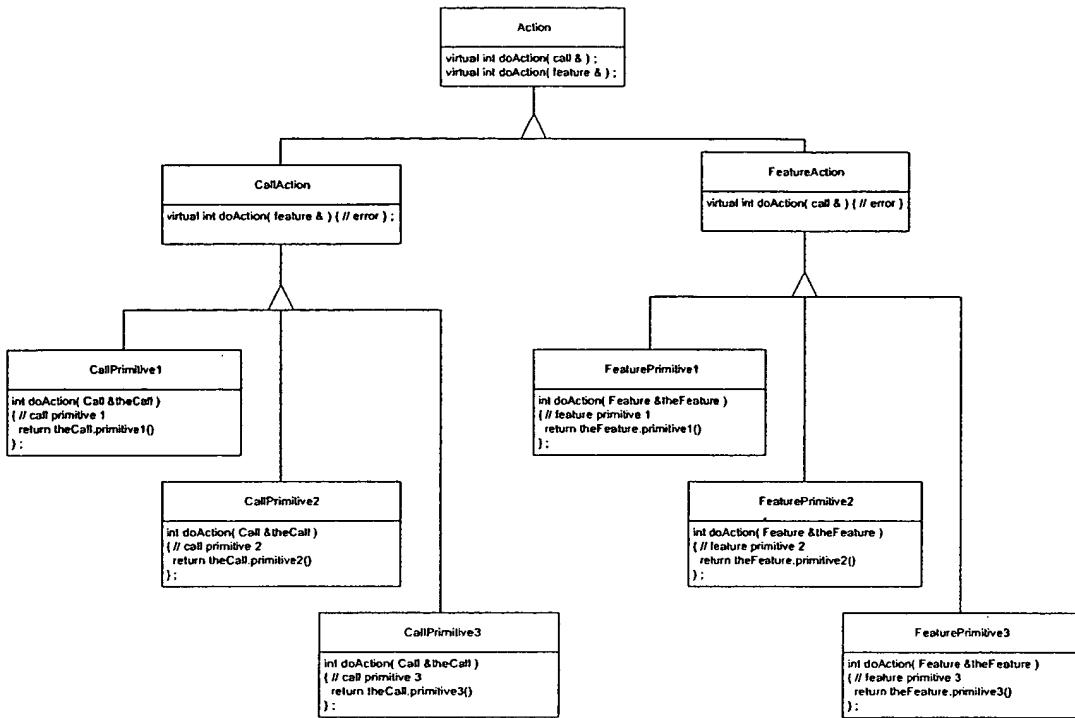
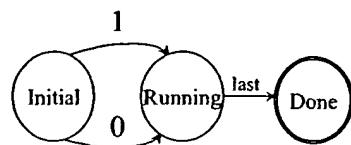


Figure 18



```

(EvenParityLogic
  (Initial (IBit () (Set odd) (Running))
  (OBit () (Set even) (Running))
  (Last ()) (Print "Error!") (Initial))
  )
  (Running (IBit (((IsOdd?) (Set even) (Running))
  ((IsEven?) (Set odd) (Running)))
  )
  (OBit () () (Running))
  )
  (Last (((IsOdd?) (Print "Bad!")) (Done))
  ((IsEven?) (Print "Good!")) (Done))
  )
  )
  (Done ())
)
  
```

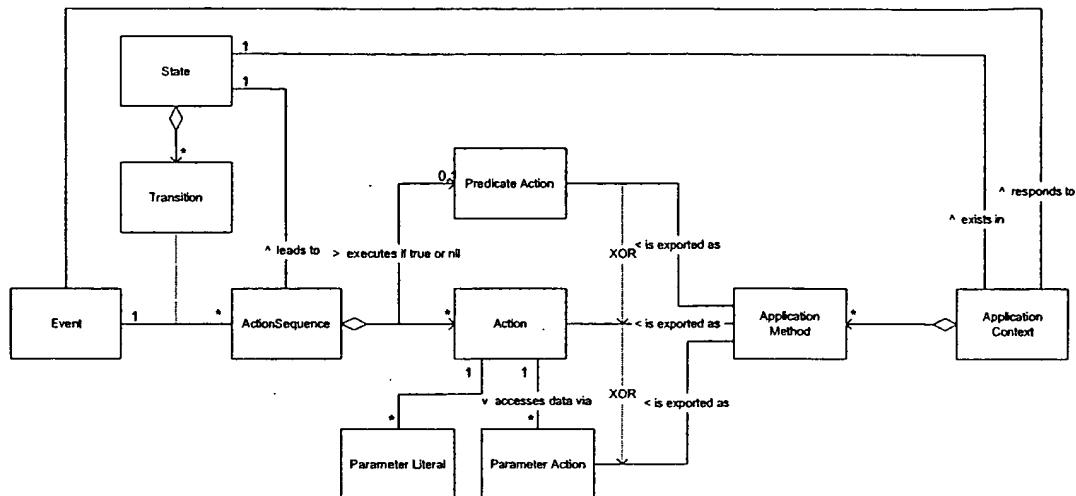
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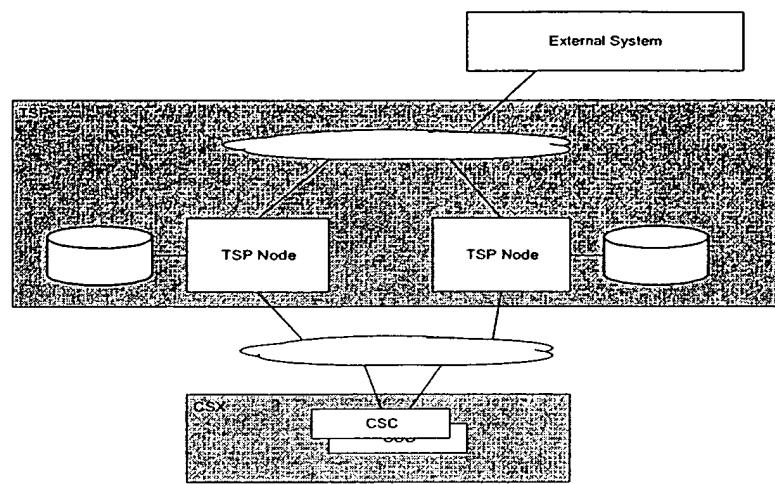
(OddParityLogic
  (Initial (IBit () (Set odd) (Running))
  (OBit () (Set even) (Running))
  (Last ()) (Print "Error!") (Initial))
  )
  (Running (IBit (((IsOdd?) (Set even) (Running))
  ((IsEven?) (Set odd) (Running)))
  )
  (OBit () () (Running))
  )
  (Last (((IsOdd?) (Print "Good!")) (Done))
  ((IsEven?) (Print "Bad!")) (Done))
  )
  )
  (Done ())
)
  
```

Figure 19

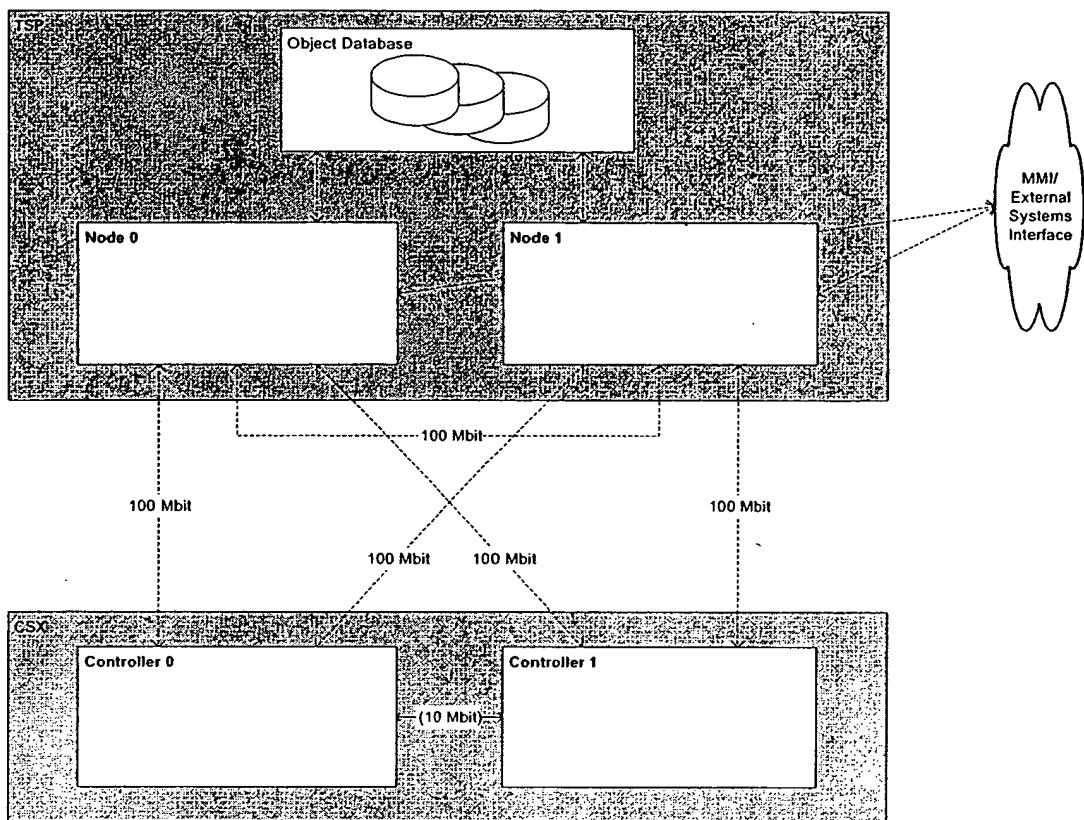
```
(LogicName
  (StateName
    (EventName
      ((Predicate)
        (ActionName ())
        (ActionName (ParamSpec,...))
        (StateName)
      )
      ((() (ActionName (ParamSpec,...))
        (ActionName (ParamSpec,...))
        (StateName)
      )
      )
    )
    (EventName
      ((Predicate)
        (ActionName (ParamSpec,...))
        (ActionName (ParamSpec,...))
        (StateName)
      )
      ((() (ActionName (ParamSpec,...))
        (ActionName (ParamSpec,...))
        (StateName)
      )
      )
    )
  )
  (StateName
    (EventName
      ((Predicate)
        (ActionName (ParamSpec,...))
        (ActionName (ParamSpec,...))
        (StateName)
      )
    )
  )
)
```

Figure 20

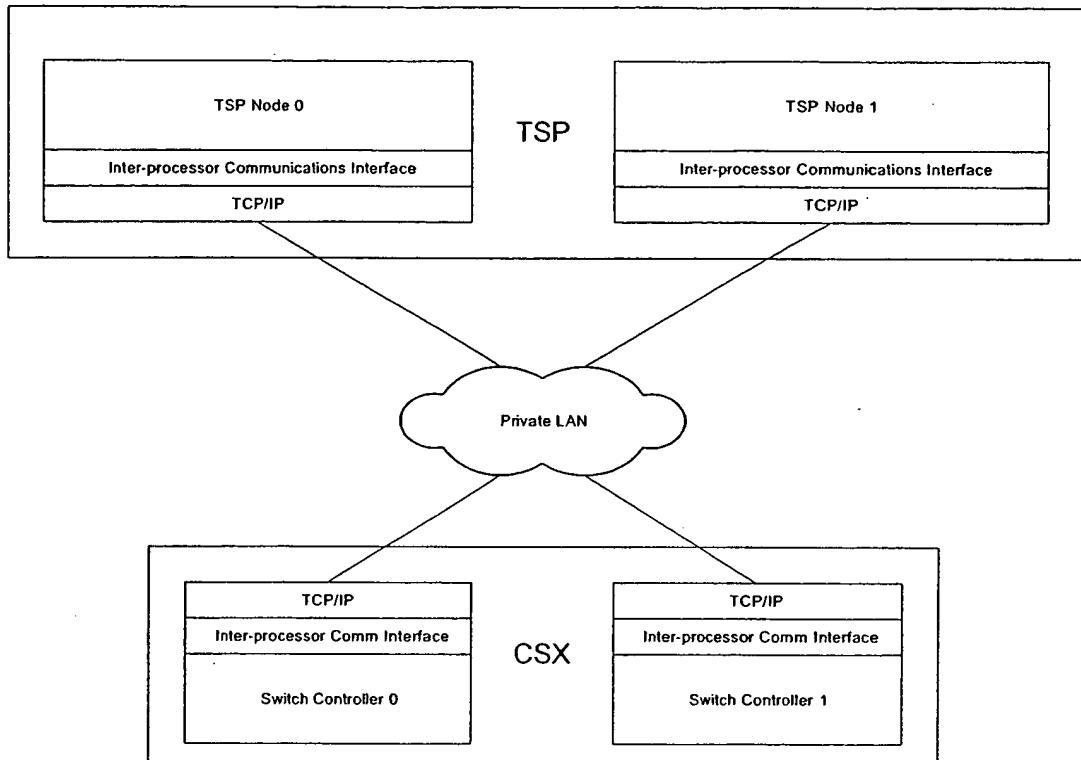
**Figure 21**



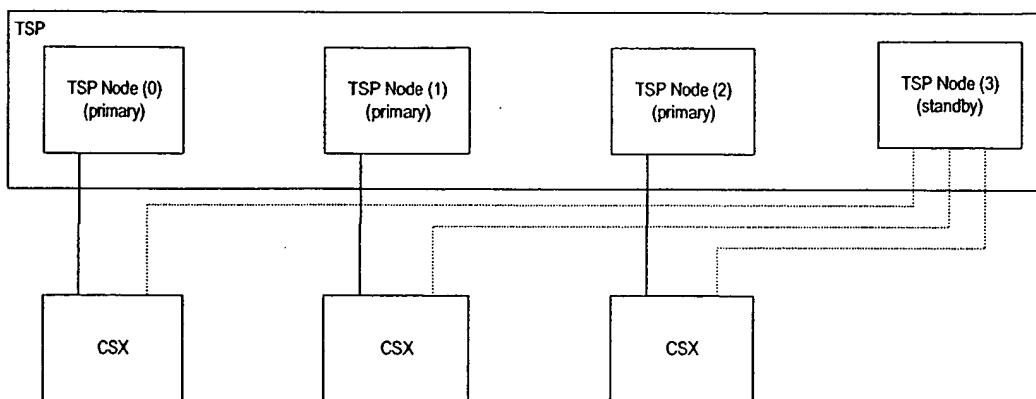
**Figure 22**



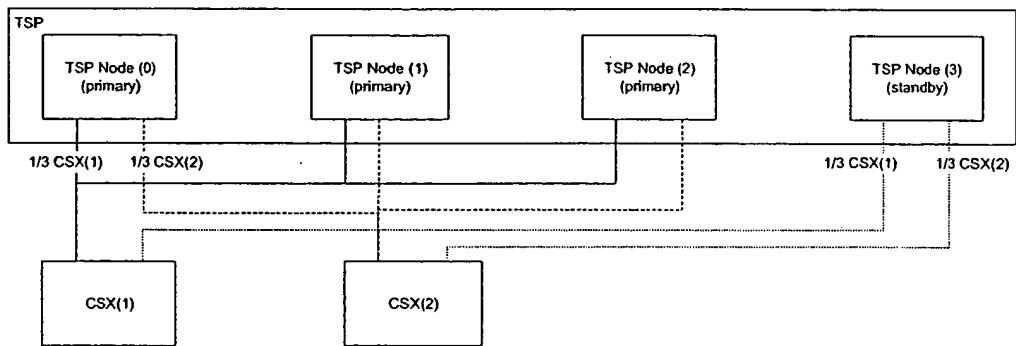
**Figure 23**



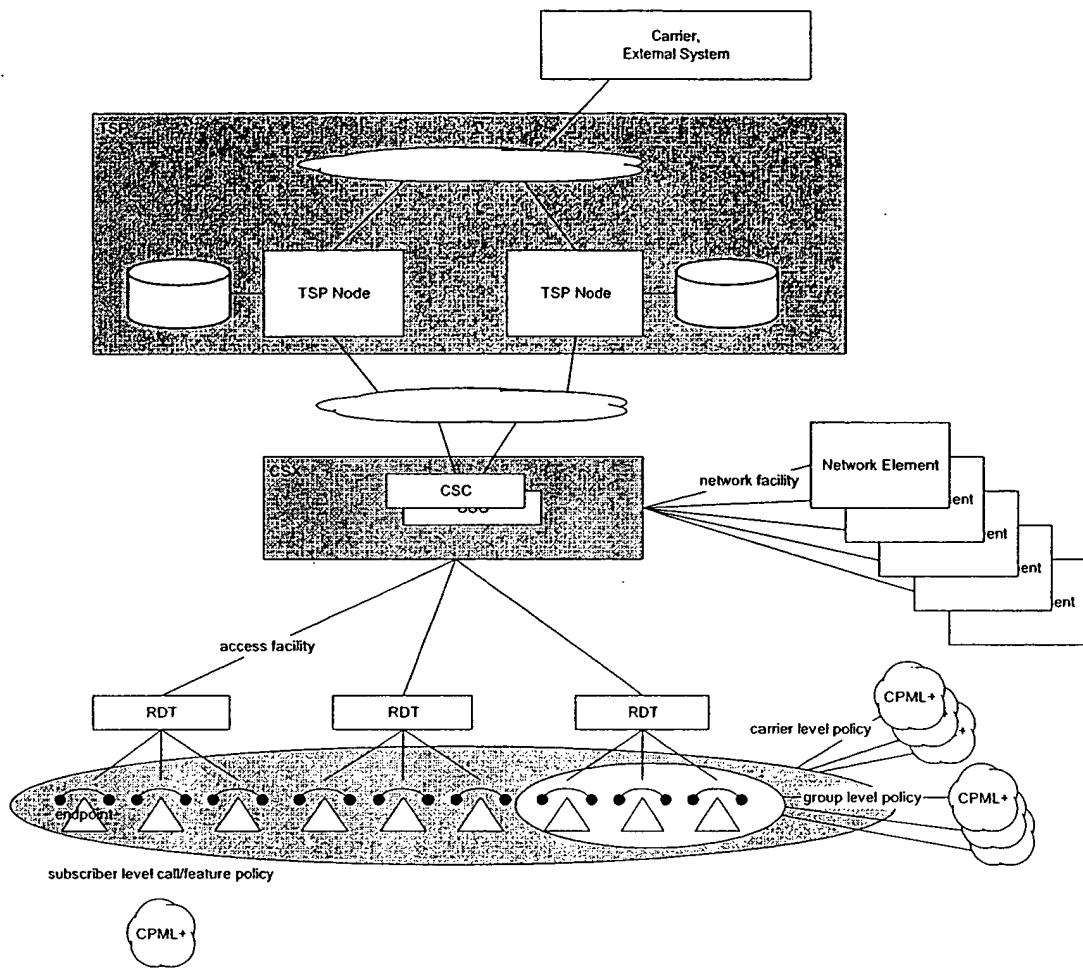
**Figure 24**



**Figure 25**



**Figure 26**

**Figure 27**

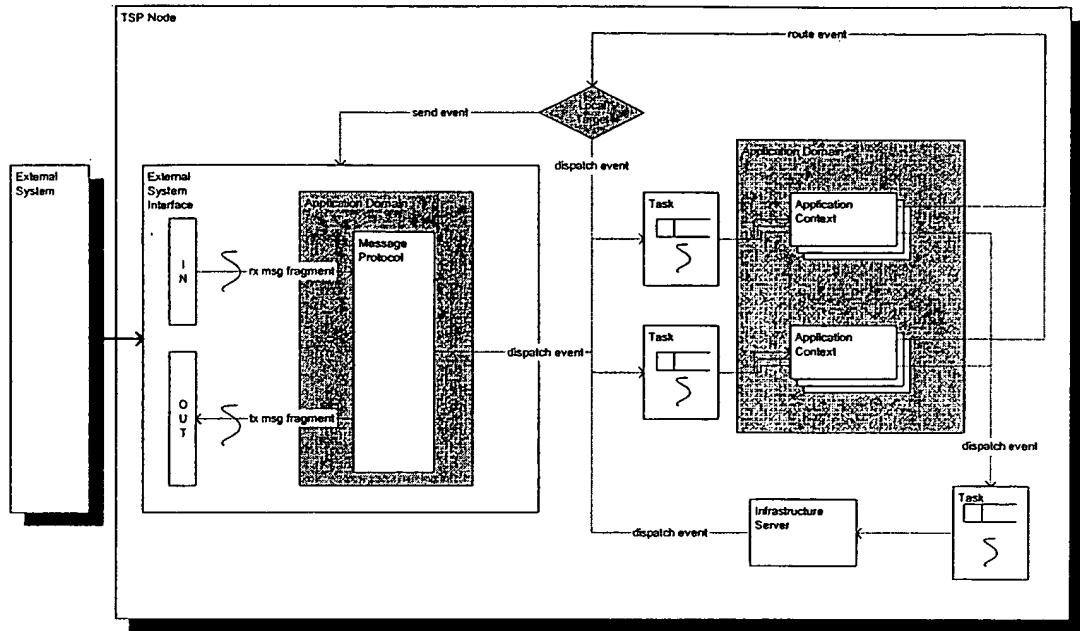


Figure 28A

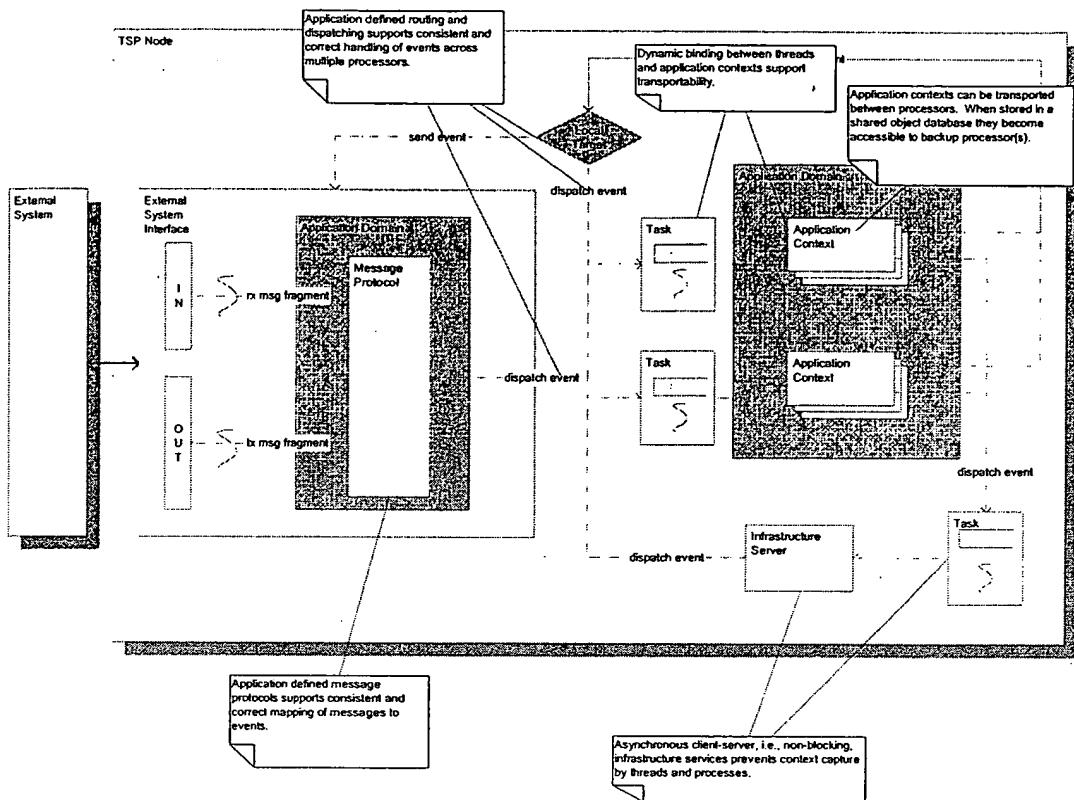
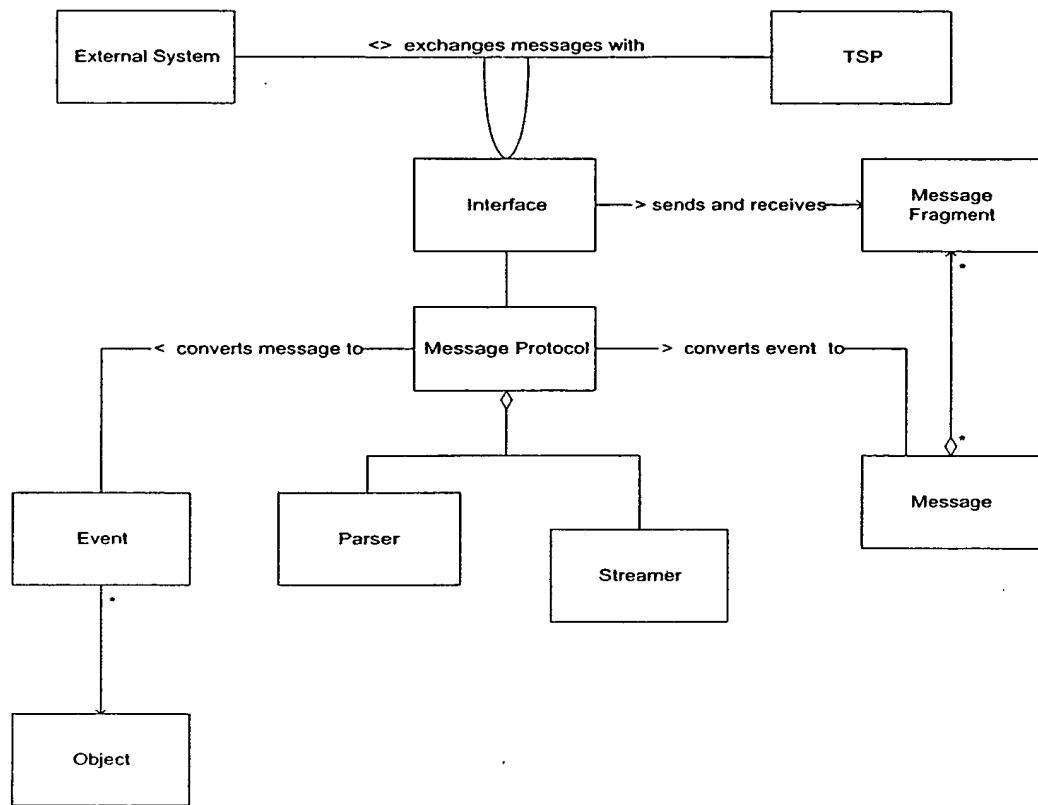


Figure 28B



**Figure 29**

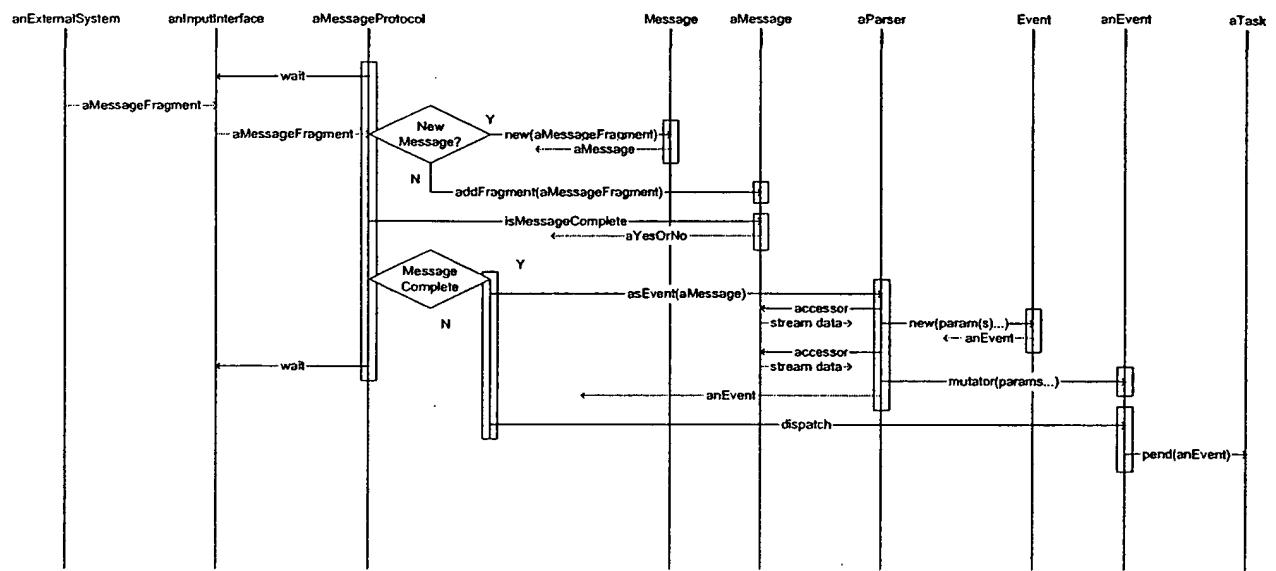


Figure 30A

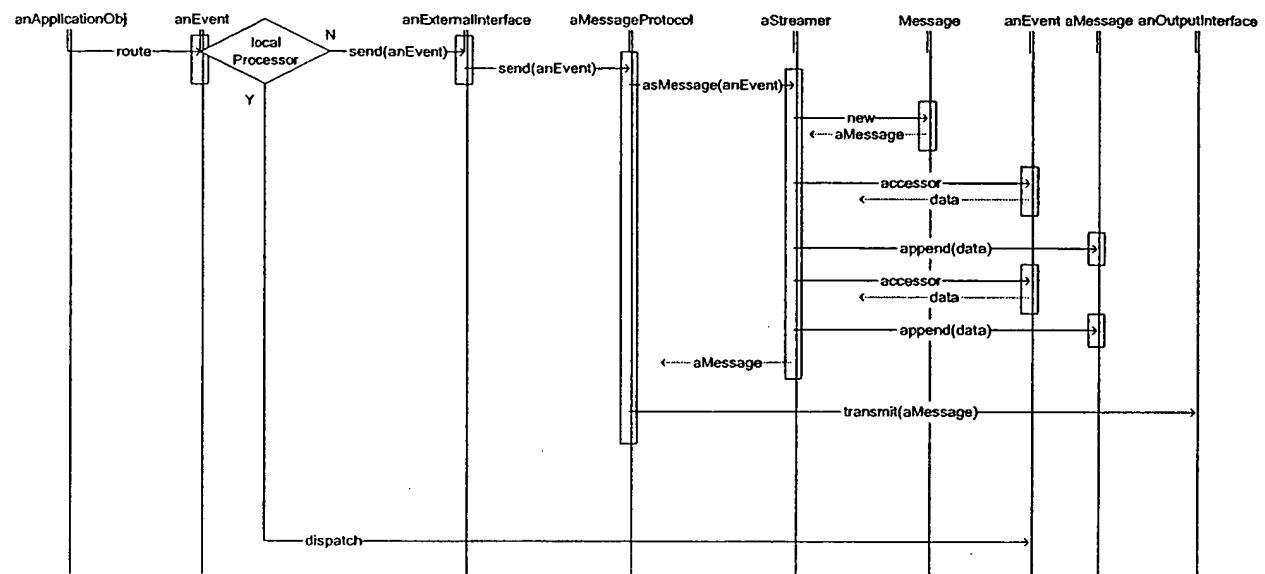


Figure 30B

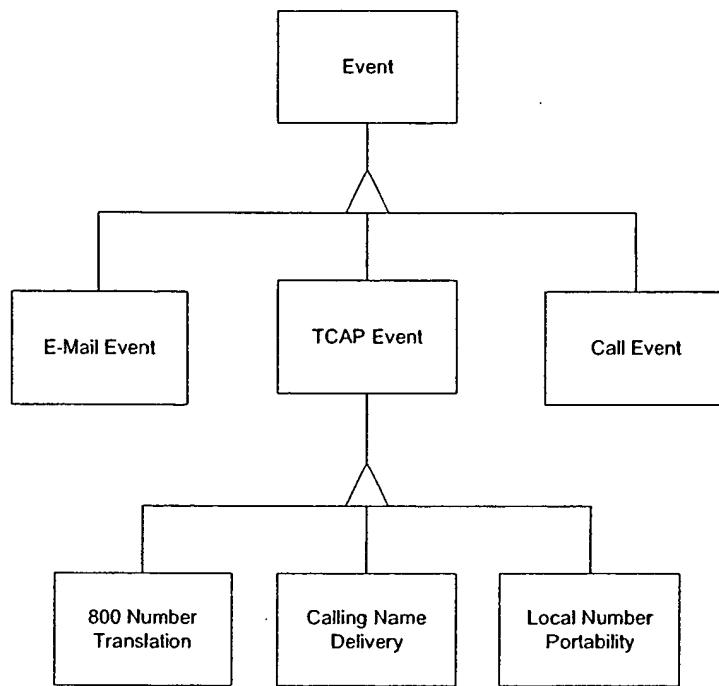


Figure 31

**Call/Feature Policy**

<b>Definition</b>	Describes call and feature processing behavior.
<b>Native Format</b>	ASCII based markup (CPML, CPML+) for external usage and maintenance. Object(s) for internal processing.
<b>Source/Authority</b>	Service maintenance and provisioning; the TSP/CSX product provides standardized call and class 5 feature definitions. Service Creation Environment (tool?) provides capability to create new or modify existing call and/or feature policies.
<b>Value Initiation Frequency (Low)</b>	Assuming that most polices are defined at carrier or group levels, new call and feature policies with the introduction of new group level call and features types. This frequency is less than the subscriber provisioning frequency. For individual level call and feature types, call and feature policies may be introduced coincident with the provisioning of new subscribers.
<b>Value Change Frequency (Low to Moderate)</b>	In general, call and feature logic elements change infrequently—when call or feature logic is modified or upgraded. This frequency is less than the subscriber provisioning frequency. Call and feature parameter elements, e.g., call forwarding destination number, may change at or above the subscriber provisioning frequency. Some parameter elements may change as much as hourly.
<b>Value Access Frequency (High)</b>	Call and feature policies, including logic and parameter elements, are accessed with each call.
<b>Schema Change Frequency (Low)</b>	Call and feature policy schemas define the structure with which calls and call features are described. Once mature, the schema for defining calls and features should change very infrequently; only as often as needed to upgrade call type and feature specification capabilities.
<b>Consumer(s)</b>	Call and feature processing.
<b>Consumer Format</b>	Object(s)
<b>Replications and Sharing</b>	TSP nodes share call and feature processing specifications.
<b>Scope</b>	System, Group, and Individual Subscriber
<b>Volume</b>	Group and system level logic elements have few instances. Individual level logic elements are coincident with subscriber volumes. Parameter element volumes are a function of the number of parameterized features in combination with the subscriber population size.

**Figure 32A**

**Route**

<b>Definition</b>	Describes transmission paths between a network element and its associated endpoints and other network elements and the characteristics of those paths.
<b>Native Format</b>	
<b>Source/Authority</b>	<b>OAM&amp;P</b>
<b>Value Initiation Frequency (Low)</b>	New route entities are introduced when new transmission paths are provisioned and when new transmission path characteristics are provisioned.
<b>Value Change Frequency (Low)</b>	Since routes are related to physical equipment and transmission facilities, routes are relatively static.
<b>Value Access Frequency (High)</b>	Route data is accessed for each call.
<b>Schema Change Frequency (Low)</b>	
<b>Consumer(s)</b>	Call processing.
<b>Consumer Format</b>	
<b>Replications and Sharing</b>	Multiple TSP nodes share route data entities.
<b>Scope</b>	
<b>Volume</b>	Route volumes are a function of the count of endpoints, associated network elements, and transmission path characteristics.

**Figure 32B**

**Endpoint/Subscriber**

<b>Definition</b>	Describes endpoint devices (within scope of TSP/CSX), the configuration of those devices, subscribers associated with endpoint devices, and associates endpoint(s)/subscriber(s) with call and feature policies.
<b>Native Format</b>	
<b>Source/Authority</b>	Subscriber care (subscriber provisioning and maintenance).
<b>Value Initiation Frequency (Low)</b>	Endpoint/subscriber instances are initiated as new subscribers are added to the carrier's subscriber base. Call and feature policy associations are initiated as new call types and features are deployed and as subscribers subscribe to different services.
<b>Value Change Frequency (Low)</b>	Value changes occur as subscribers modify their calling and/or feature parameters.
<b>Value Access Frequency (High)</b>	Endpoint/subscriber data is accessed with each call.
<b>Schema Change Frequency (Low to Moderate)</b>	Endpoint schema changes only with software product upgrades. Subscriber schema may be extended through introduction of new features.
<b>Consumer(s)</b>	Call and Feature processing.
<b>Consumer Format</b>	Object
<b>Replications and Sharing</b>	Multiple TSP nodes share Endpoint/subscriber data.
<b>Scope</b>	
<b>Volume</b>	Endpoint/subscriber volumes equal the carrier's subscriber population.

**Figure 32C**

### Call/Feature State

<b>Definition</b>	Describes the current state of calls and/or call features.
<b>Native Format</b>	Object
<b>Source/Authority</b>	Call and Feature Processing; call and feature state data is generated and maintained for each call and/or feature.
<b>Value Initiation Frequency (High)</b>	Call state instances are initiated with each call. Feature state instances are initiated as needed based on call level events.
<b>Value Change Frequency (High)</b>	Call and feature state changes occur in response to events throughout the life of the associated call and/or feature(s).
<b>Value Access Frequency (High)</b>	Call and feature state are accessed in order to service events throughout the life of the associated call and/or feature(s).
<b>Schema Change Frequency (Low)</b>	Call and feature state objects a combination of native application objects and instantiations of call and feature policy schemas. Native object schemas change only with product software upgrades. Call and feature policy schema changes are addressed elsewhere.
<b>Consumer(s)</b>	Call and feature processing.
<b>Consumer Format</b>	Object
<b>Replications and Sharing</b>	Call and feature states are replicated in support of fault tolerance capabilities.
<b>Scope</b>	
<b>Volume</b>	Call and feature volumes are a function of the subscriber population combined with the subscriber's calling frequency constrained by transmission capabilities.

**Figure 32D**

### Equipment/Facility

<b>Equipment/Facility</b>	
Definition	Describes an equipment item or a transmission facility, and the configuration of that equipment item or transmission facility. Equipment items include processor devices, remote data terminals, intelligent peripherals, etc. Transmission facilities include network facilities, which connect a CSX to an external network element, and access facilities, which provide endpoints with access to the carrier's network.
Native Format	MIB?
Source/Authority	OAM&P
Value Initiation Frequency (Low)	New equipment descriptions are introduced when the carrier adds new equipment components. New network facilities are introduced when the carrier adds new transmission facilities.
Value Change Frequency (Low)	Changes in equipment and transmission facility descriptions and configurations are rare once provisioned and stable.
Value Access Frequency (Low)	Equipment and transmission facility descriptions and configurations are accessed only during system initialization and re-boots.
Schema Change Frequency (Low)	Equipment and transmission facility schemas change only support for new equipment and/or transmission types is added to the product.
Consumer(s)	System initialization and OA&P processes.
Consumer Format	
Replications and Sharing	TSP nodes share some of the equipment and transmission facility description and configuration data. TSP and CSX elements share certain categories of equipment and transmission facility descriptions and configurations.
Scope	
Volume	This is a function of the count of equipment items and transmission facilities.

**Figure 32E**

**Equipment/Facility State**

<b>Definition</b>	Describes the present state of an equipment item or a transmission facility.
<b>Native Format</b>	MIB?
<b>Source/Authority</b>	OA&M processes, certain aspects of call processing. NMS may command state changes.
<b>Value Initiation Frequency (Low)</b>	Equipment and facility states are initiated during system initialization and re-boots.
<b>Value Change Frequency (Moderate to High)</b>	Certain types of equipment and transmission facilities change state frequently. Other types change state with only moderate frequency. Aggregate equipment and facility states change with less frequency than individual components.
<b>Value Access Frequency (Varies from Low to High)</b>	In general, this data is accessed at NMS polling intervals. State data that contributes to statistics may be sampled at frequent intervals.
<b>Schema Change Frequency (Low)</b>	Equipment and facility state schemas change only with product upgrades.
<b>Consumer(s)</b>	NMS
<b>Consumer Format</b>	MIB?
<b>Replications and Sharing</b>	Multiple TSP nodes may share certain state elements. Certain equipment and facility state elements may be replicated for redundancy support.
<b>Scope</b>	
<b>Volume</b>	This is a function of the count of equipment items and transmission facilities.

**Figure 32F**

**Equipment/Facility Statistics**

<b>Definition</b>	Describes a usage or event occurrence history with respect to a particular equipment item or facility.
<b>Native Format</b>	MIB?
<b>Source/Authority</b>	OA&M processes, certain aspects of call processing.
<b>Value Initiation Frequency (Low)</b>	Values are initiated during system initialization and re-boots.
<b>Value Change Frequency (Moderate to High)</b>	Statistics on directly measured attributes change with the frequency of related events. Statistics on sampled attributes change with the sampling frequency.
<b>Value Access Frequency (Low to Moderate)</b>	These values are accessed at collection and polling intervals.
<b>Schema Change Frequency (Low)</b>	Statistic schema changes occur only with product upgrades.
<b>Consumer(s)</b>	NMS, OAM&P
<b>Consumer Format</b>	SNMP Messages, ASCII based markup logs
<b>Replications and Sharing Scope</b>	
<b>Volume</b>	Statistics volume is a function of measurement method, measurement intervals, and count of sampled entities.

**Figure 32G**

### Automated Message Accounting (AMA)

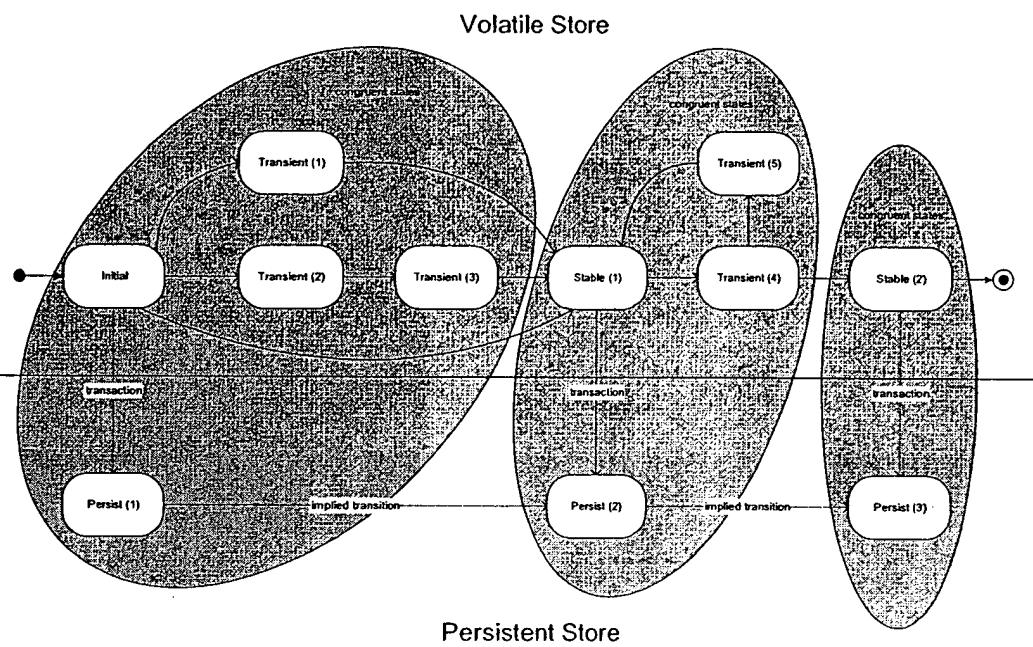
<b>Definition</b>	Describes call and feature usage characteristics relevant to call and feature billing.
<b>Native Format</b>	AMA data is packed binary coded decimal. Historically, AMA data is stored and/or transmitted in blocks according to a standard tape record format.
<b>Source/Authority</b>	Billing related processing; AMA records are generated from CDRs.
<b>Value Initiation Frequency (Low)</b>	AMA records are most likely generated according to an internal schedule, perhaps once or twice daily. AMA generation may occur on demand when polled by an external system. AMA or as specified by call and/or feature definitions to support real-time bill calculation/accounting.
<b>Value Change Frequency (Static)</b>	AMA records are static once generated.
<b>Value Access Frequency (Low)</b>	In general, AMA records are accessed only when passed to an external system for processing—under nominal circumstances this occurs once for each record. Additional accesses may occur to support recovery of an external processing exception.
<b>Schema Change Frequency (Low)</b>	New AMA schemas may be introduced with new service introductions. Existing AMA record schemas are defined by Telcordia standards and therefore change infrequently.
<b>Consumer(s)</b>	External bill processing system.
<b>Consumer Format</b>	AMA
<b>Replications and Sharing</b>	AMA data need not be replicated or shared among TSP processing nodes.
<b>Scope</b>	System
<b>Volume</b>	AMA volumes are a function of call/ feature volume.

**Figure 32H**

**Call Detail Record (CDR)**

<b>Definition</b>	Describes call and feature usage characteristics relevant to call and/or feature billing, and facility usage accounting.
<b>Native Format</b>	Log of ASCII based markup.
<b>Source/Authority</b>	Call and Feature Processing; call and feature processing generates CDRs according to call and/or feature policy.
<b>Value Initiation Frequency (High)</b>	CDRs are generated per call and per feature. There may be multiple CDRs associated with a single call or feature.
<b>Value Change Frequency (Static)</b>	CDRs are static once generated.
<b>Value Access Frequency (Low)</b>	In general, CDRs are accessed as needed to support AMA or other billing interface data generation, and as needed to support facility usage accounting.  AMA generation frequency is described elsewhere. It is anticipated that other billing formats and facility usage accounting data are generated no more often than daily.
<b>Schema Change Frequency (Moderate)</b>	New CDR schemas may be introduced with the introduction of new call types and call features.  Existing CDR schemas may be modified to support billing or facility usage accounting changes.
<b>Consumer(s)</b>	Billing and Usage Accounting processes.
<b>Consumer Format</b>	ASCII based markup.
<b>Replications and Sharing</b>	CDR data need not be replicated or shared among TSPs.
<b>Scope</b>	System
<b>Volume</b>	Generally coincident with call and feature volumes.

**Figure 32I**



**Figure 33**

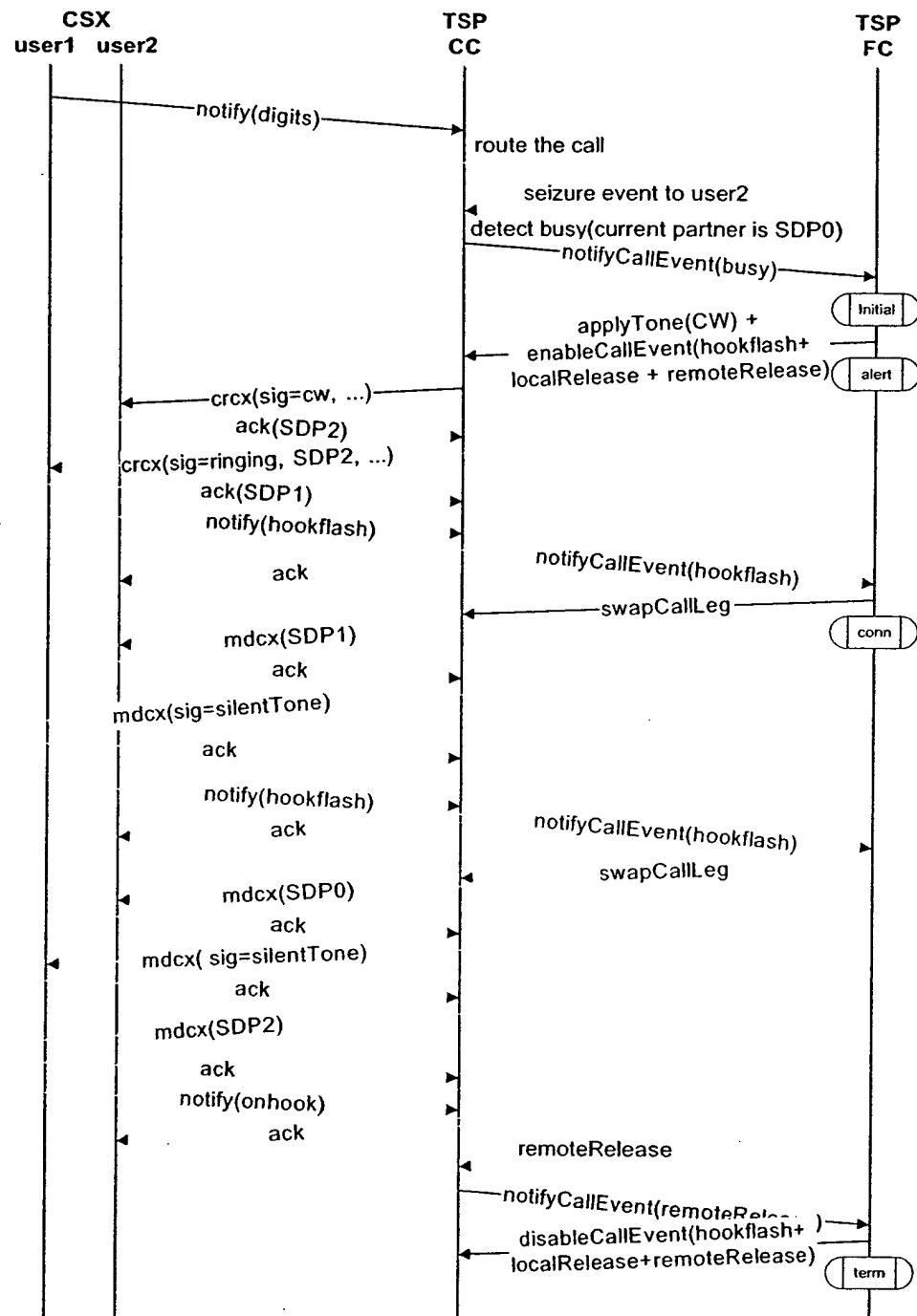
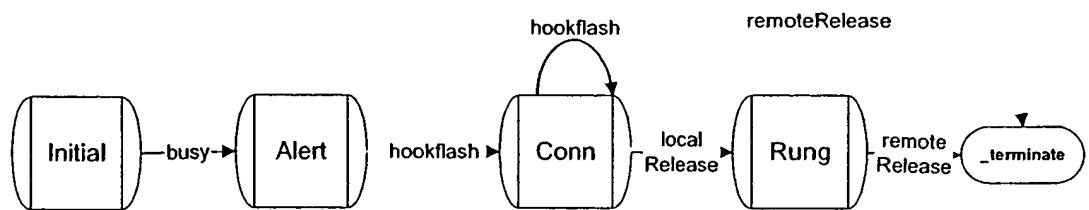


Figure 34



**Call Waiting State Machine**

**Figure 35**

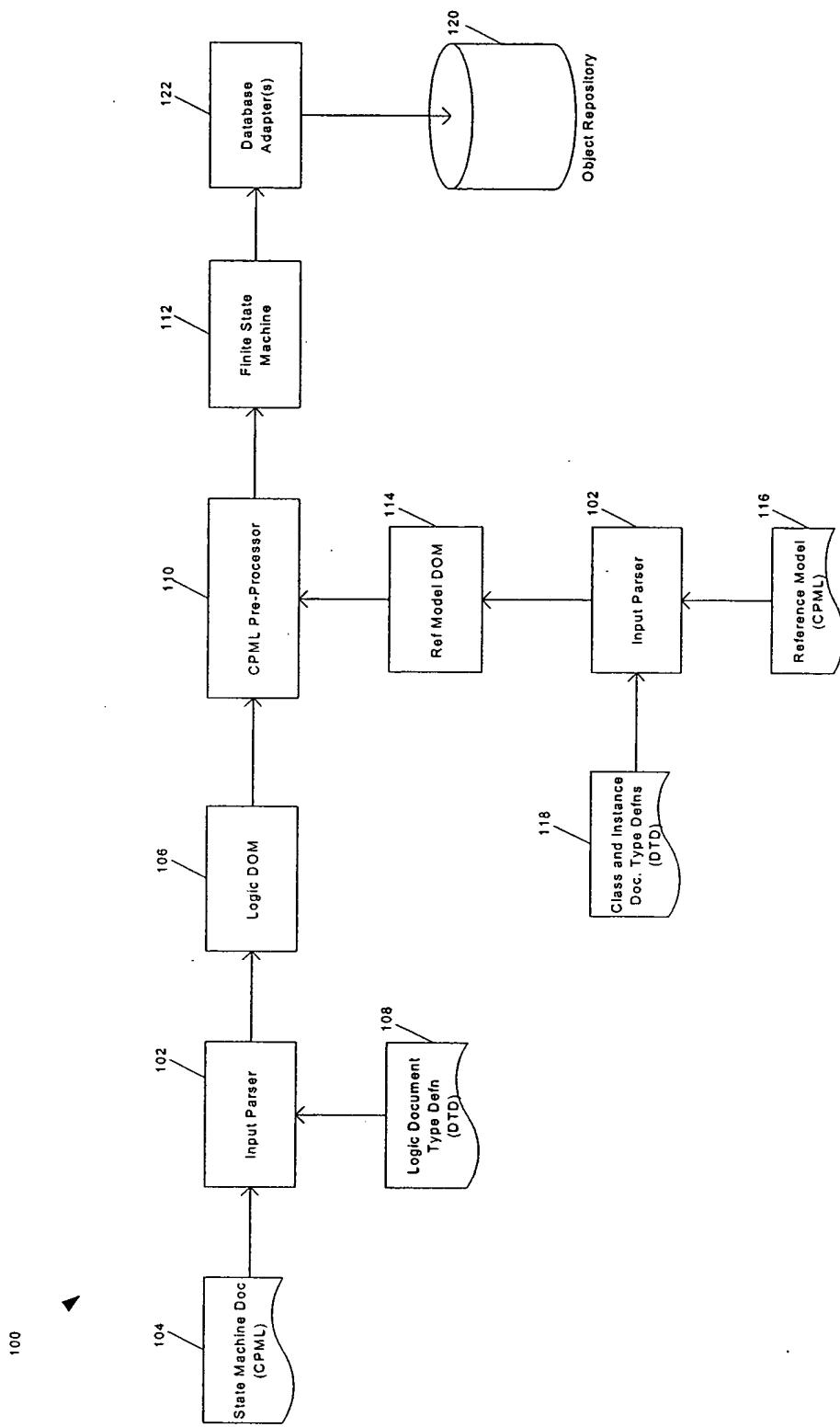


FIGURE 36

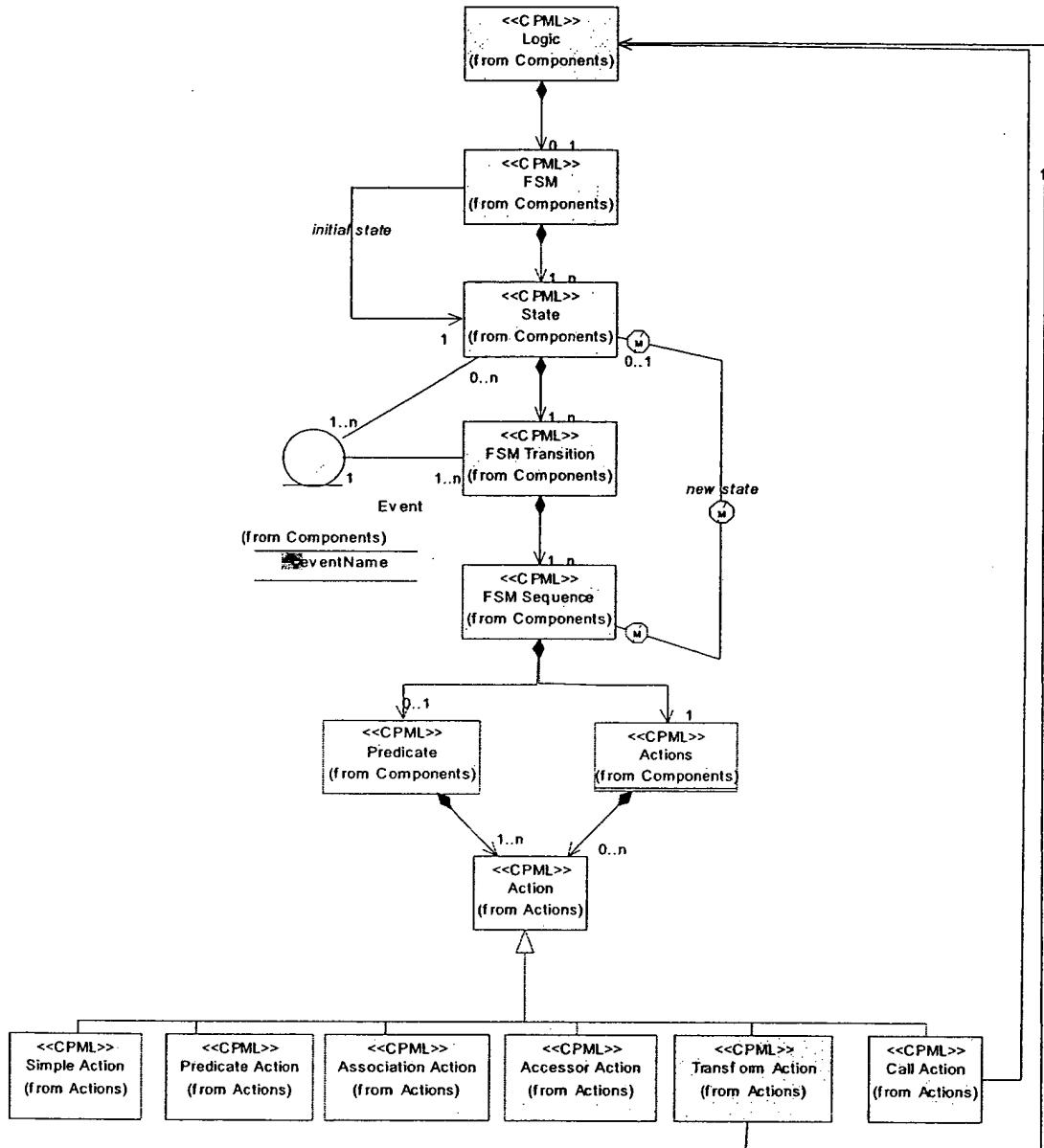


Figure 36A

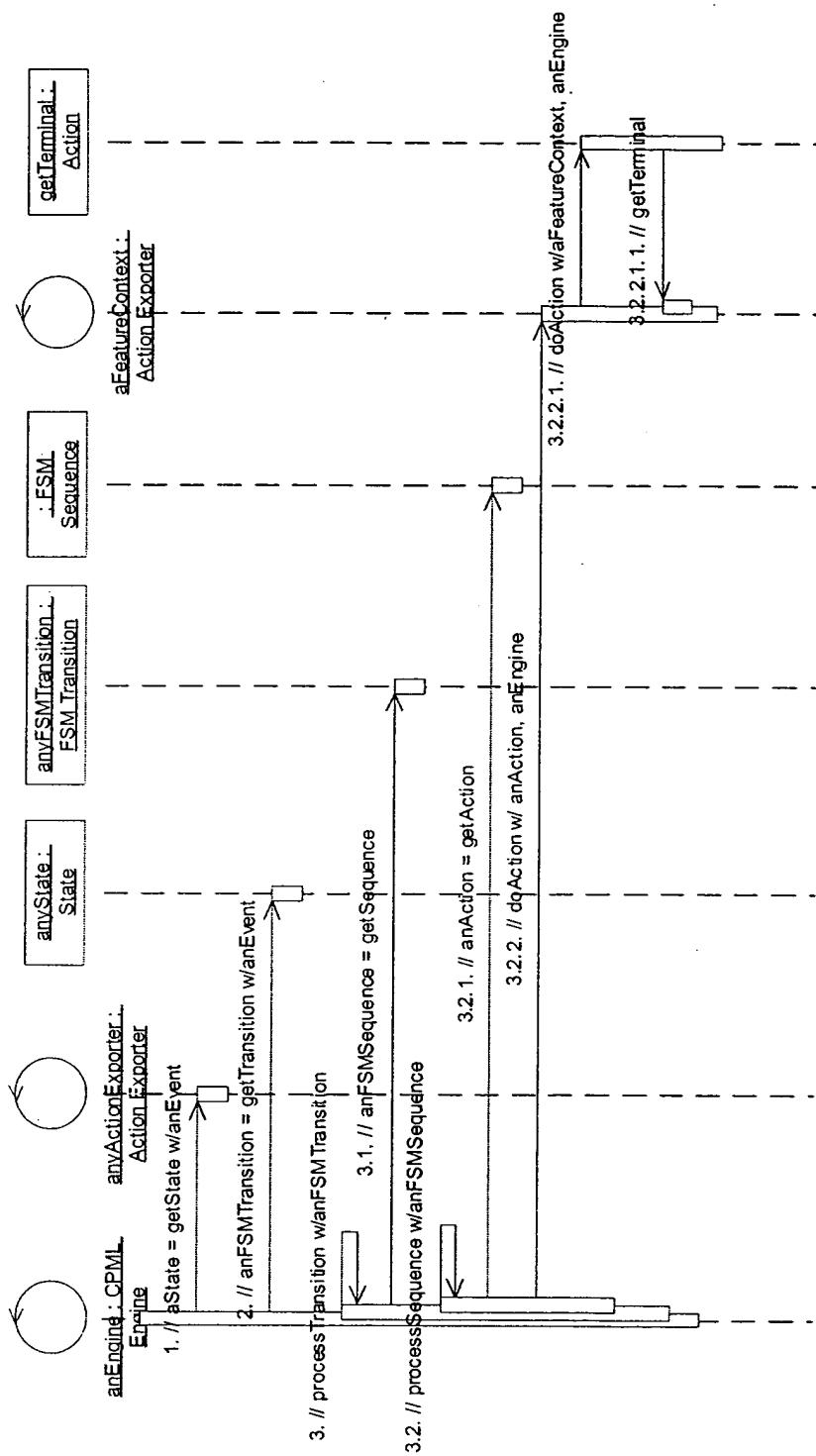


Figure 36B

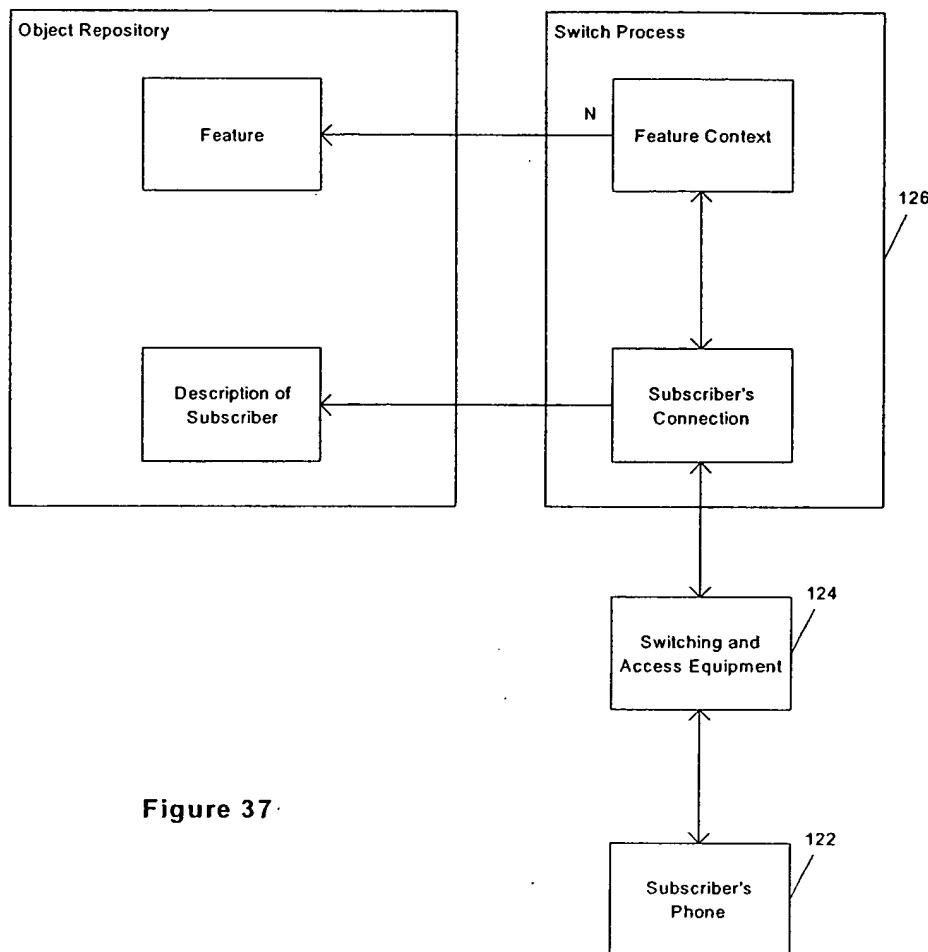


Figure 37

## Example State Machine

```
<?xml version="1.0"?>
<!DOCTYPE LOGIC SYSTEM "fsm.dtd">
<LOGIC Name="CallAuthorizationSvc">
<FSM InitState="START">
<STATE Name="START">
<TRANSITION Name="T1_1" Event="START">
<FSMSEQUENCE NextState="CALL_AUTHORIZATION_SVC_END">
<ACTIONS>
<ACTION Name="postInternalEvent">
<LITERAL Name="EventLiteral" Value="Authorized"/>
</ACTION>
</ACTIONS>
<FSMSEQUENCE>
<TRANSITION>
<STATE>
<END_STATE Name="CALL_AUTHORIZATION_SVC_END"/>
</FSM>
</LOGIC>
```



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Figure 38

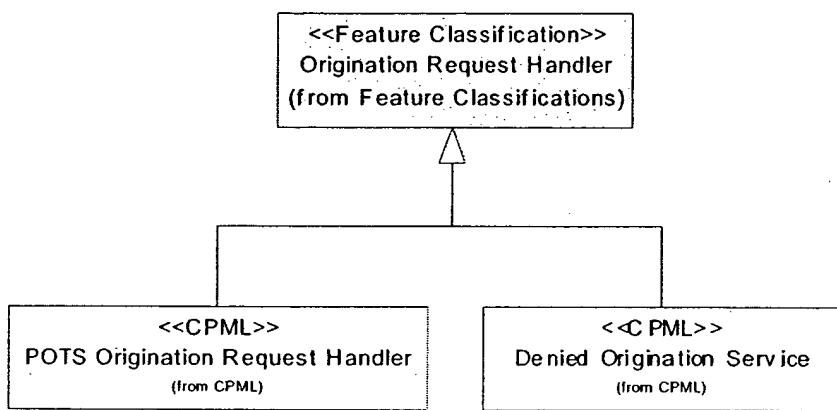
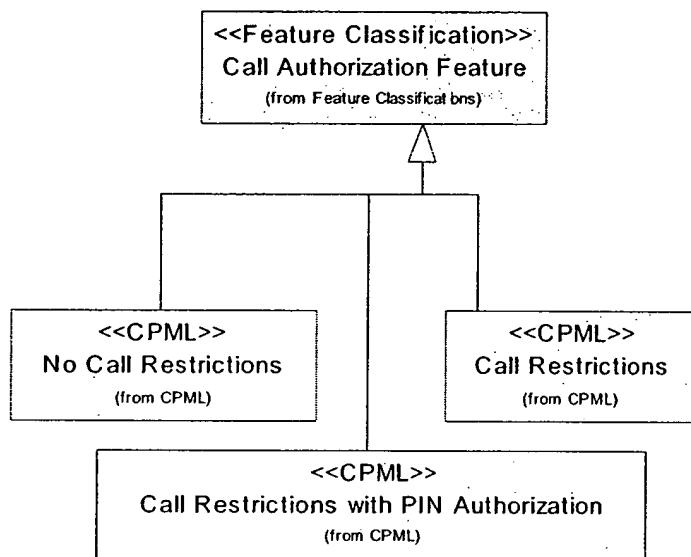
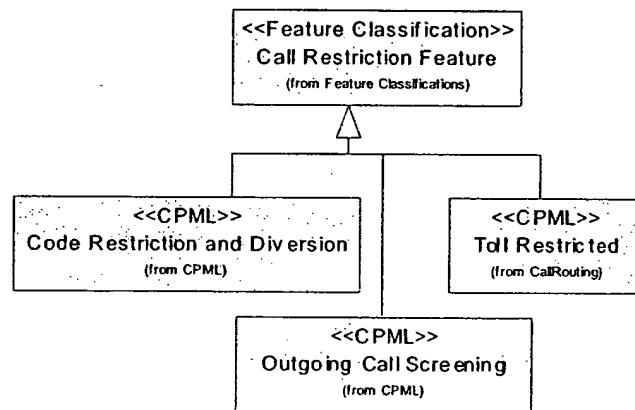


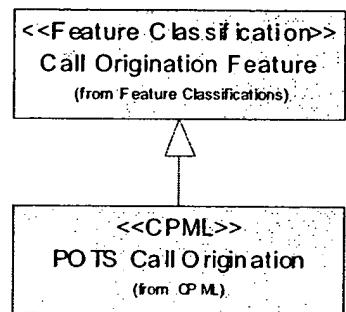
Figure 39



**Figure 40**



**Figure 41**



**Figure 42**

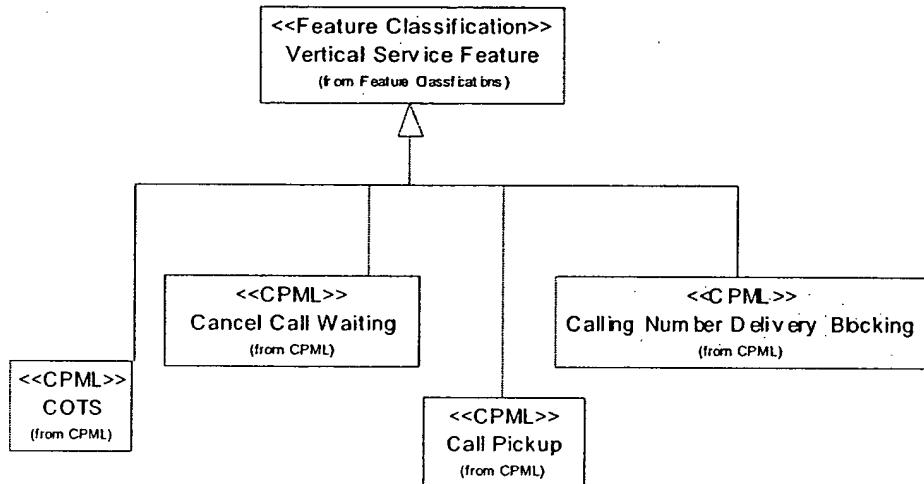


Figure 43

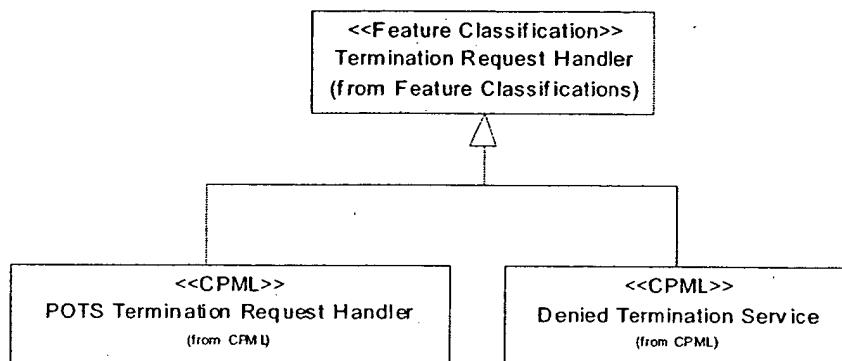


Figure 44

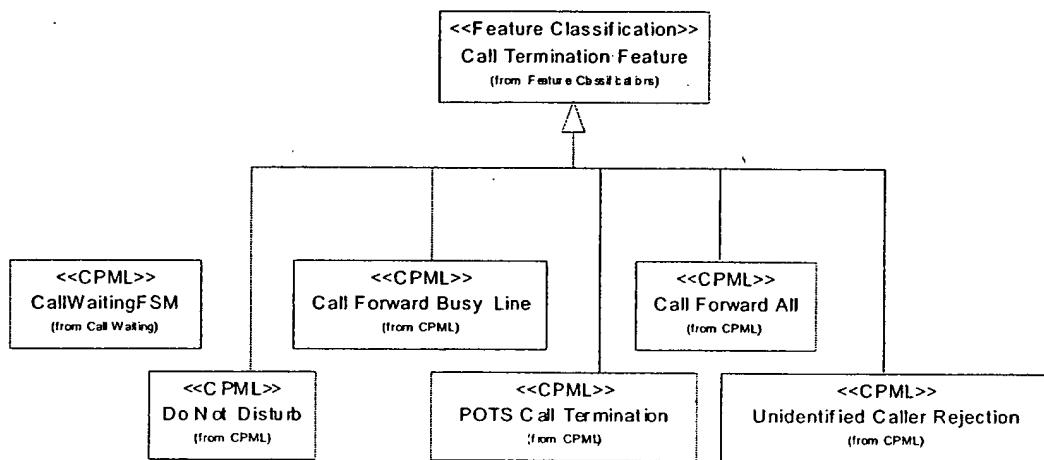


Figure 45

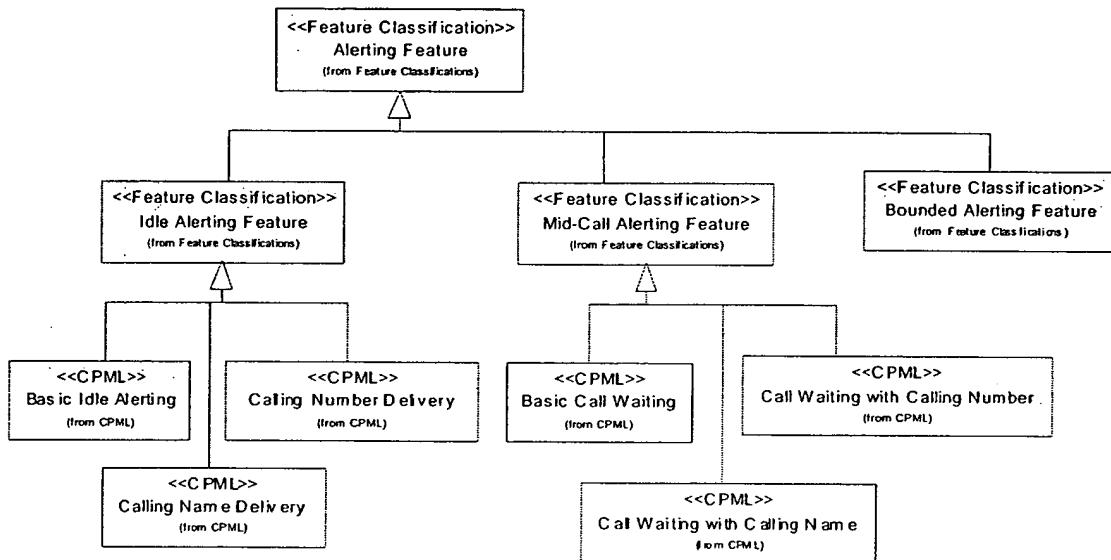


Figure 46

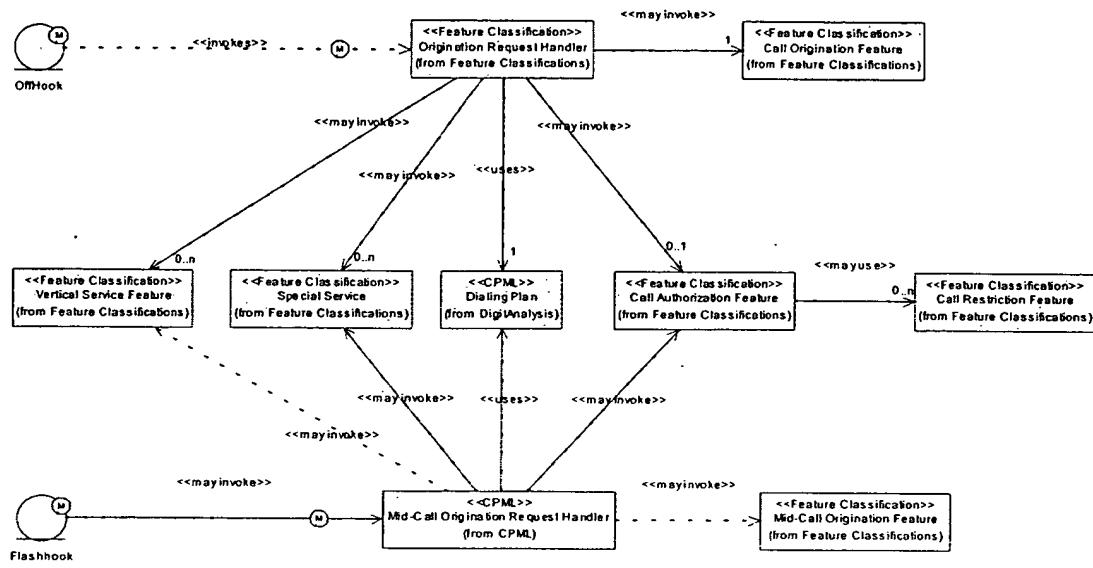


Figure 47

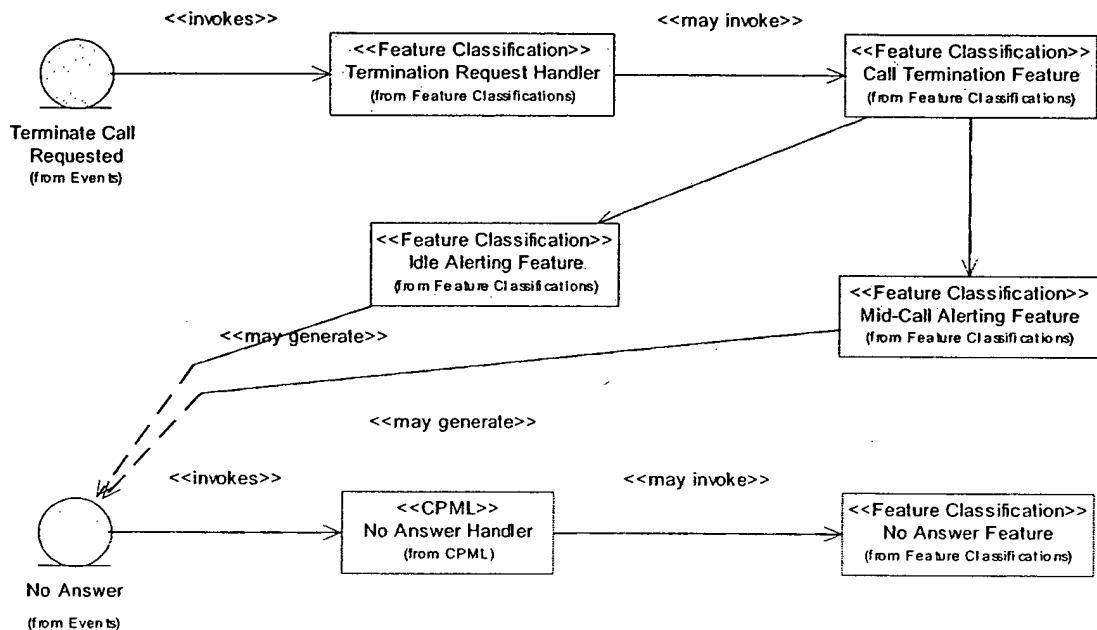


Figure 48

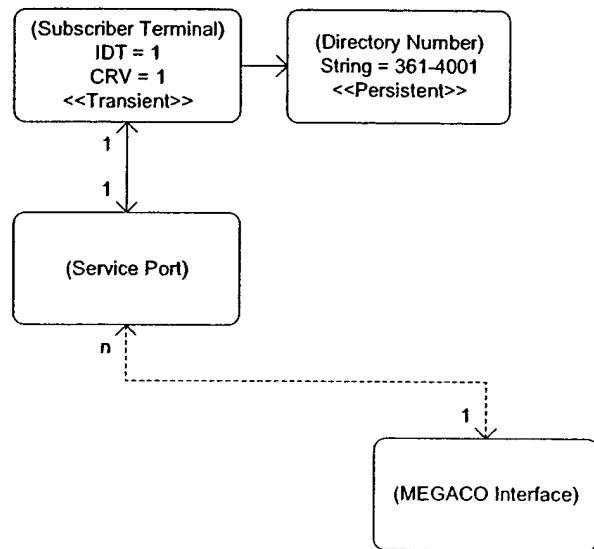


Figure 49A

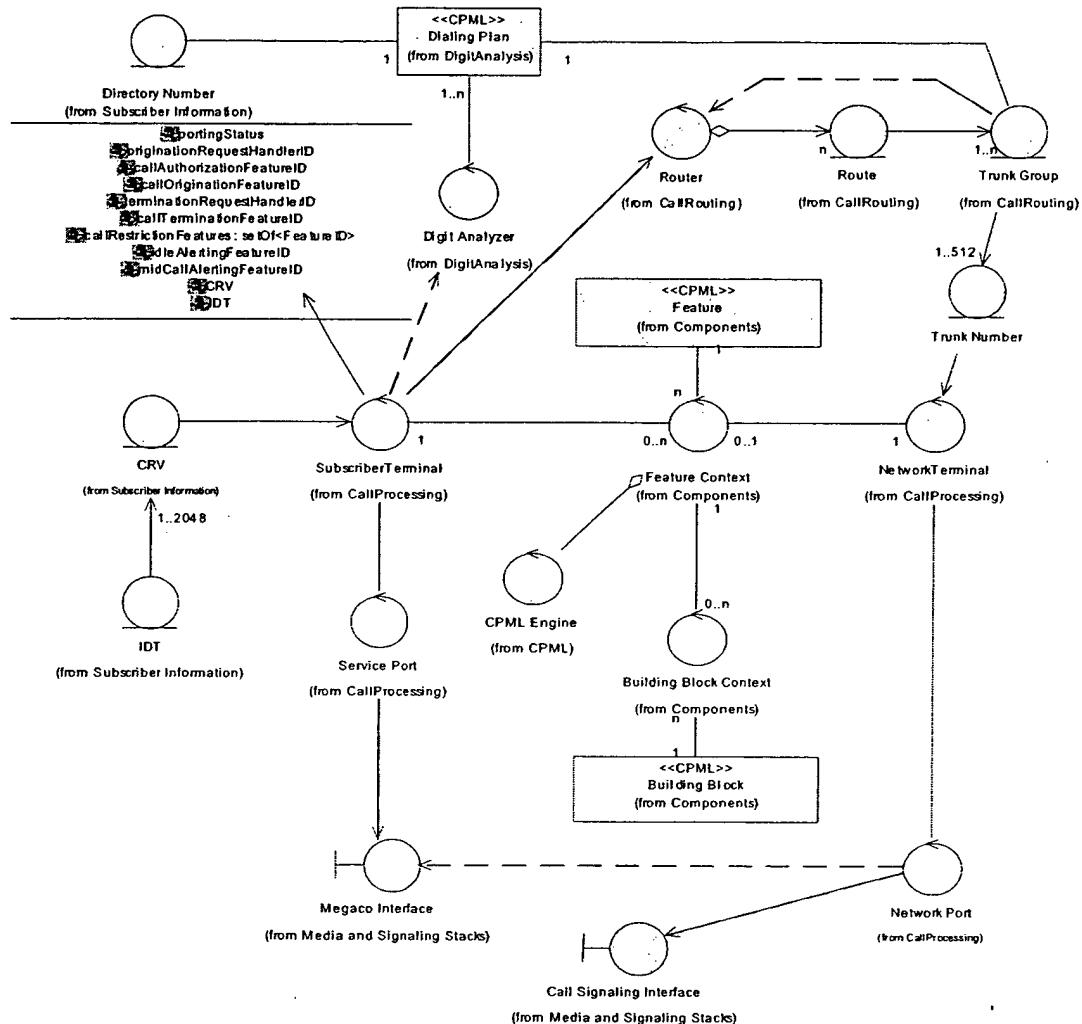
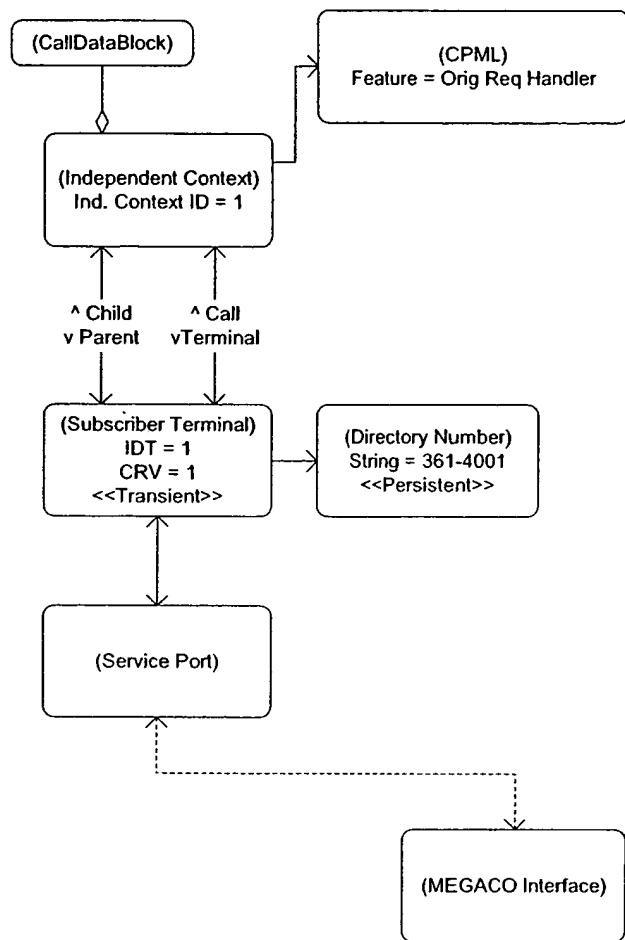
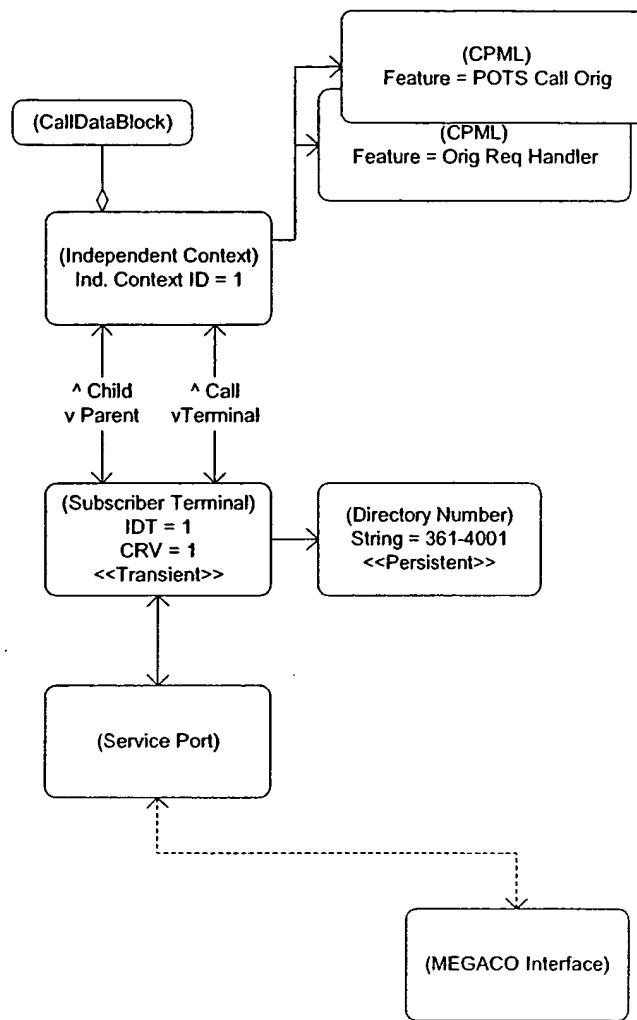


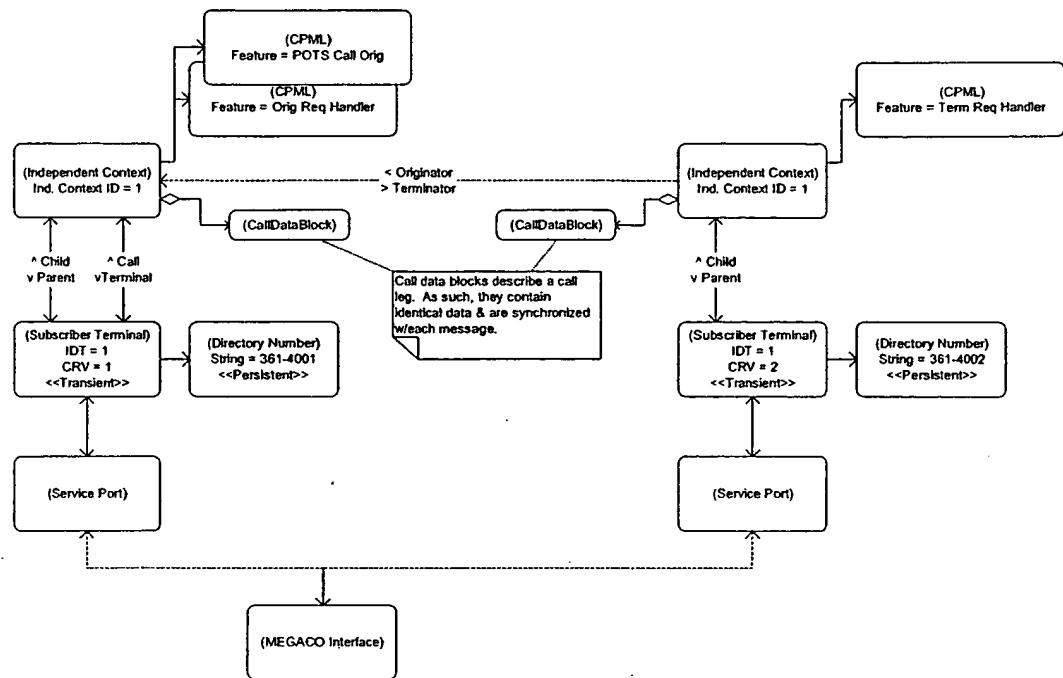
Figure 49B



**Figure 50**



**Figure 51**



**Figure 52**

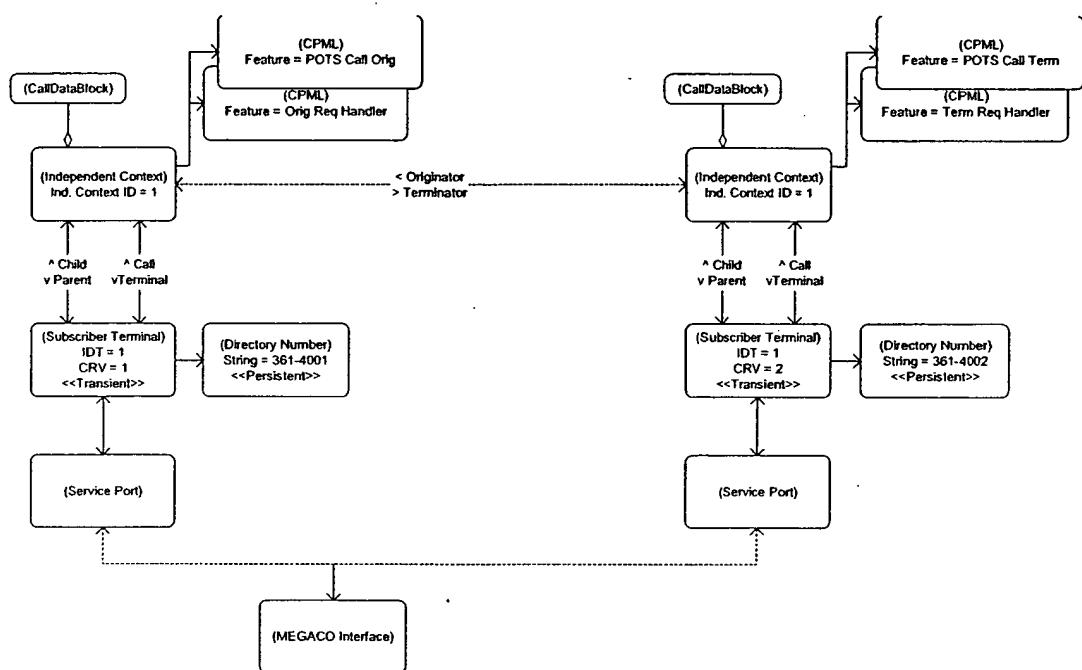


Figure 53

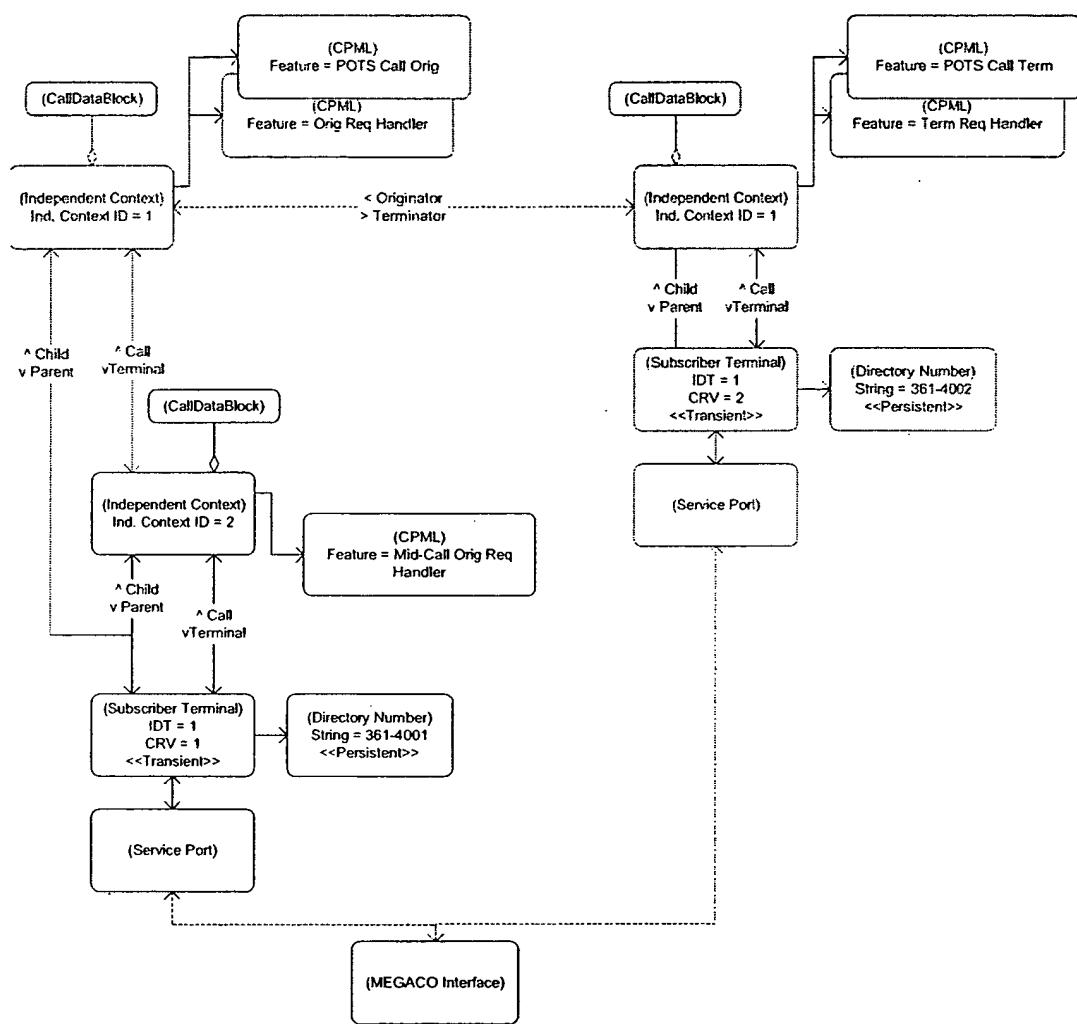


Figure 54

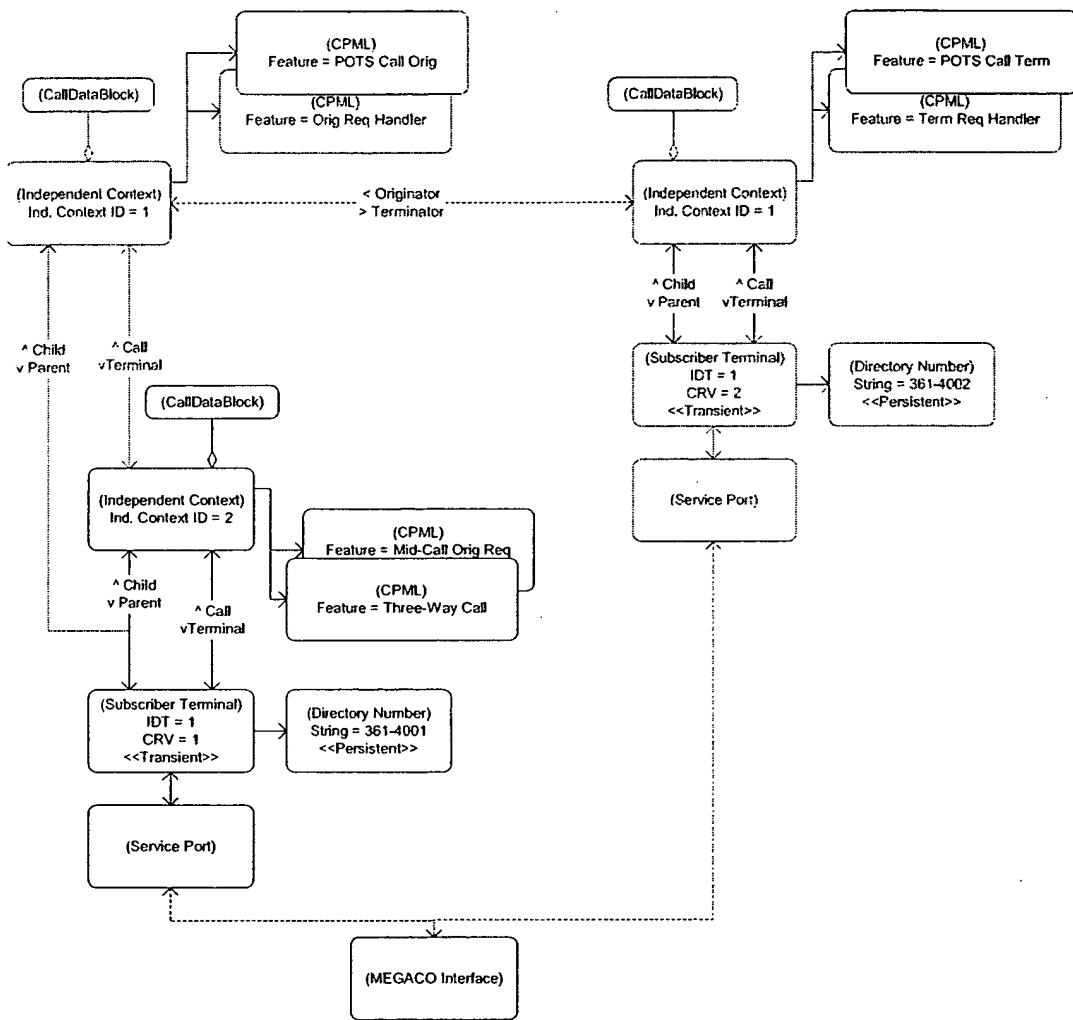


Figure 55

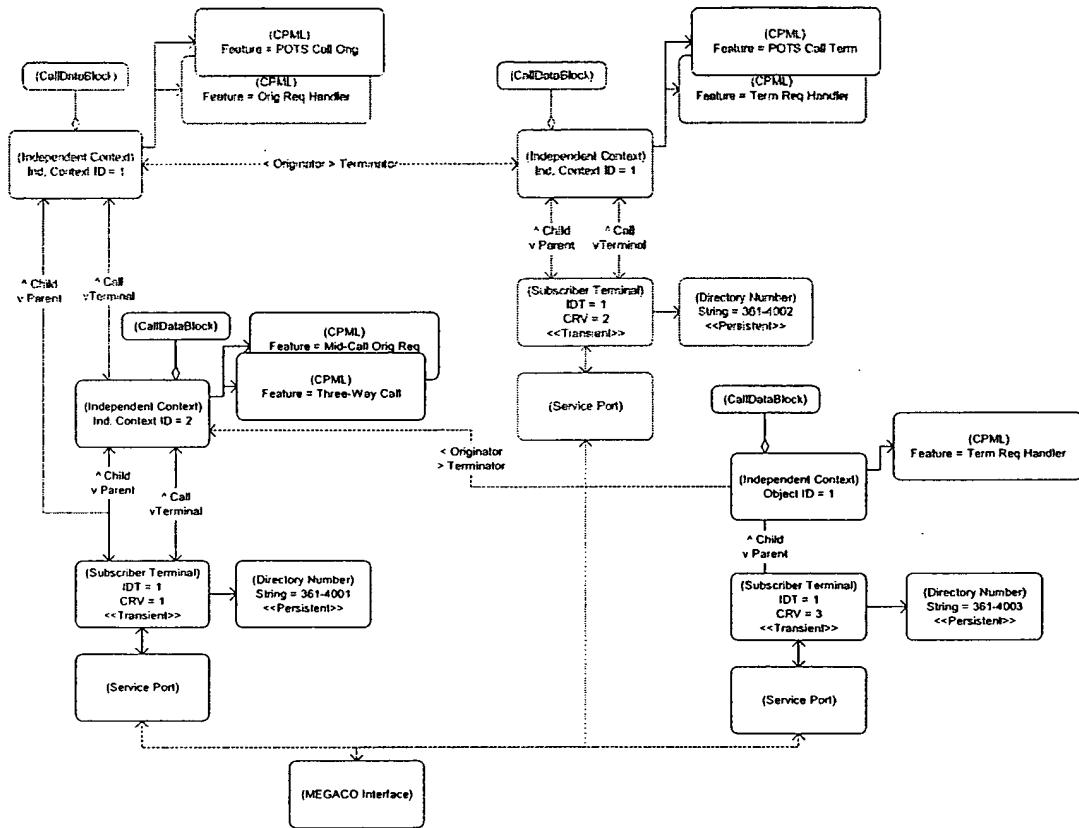


Figure 56

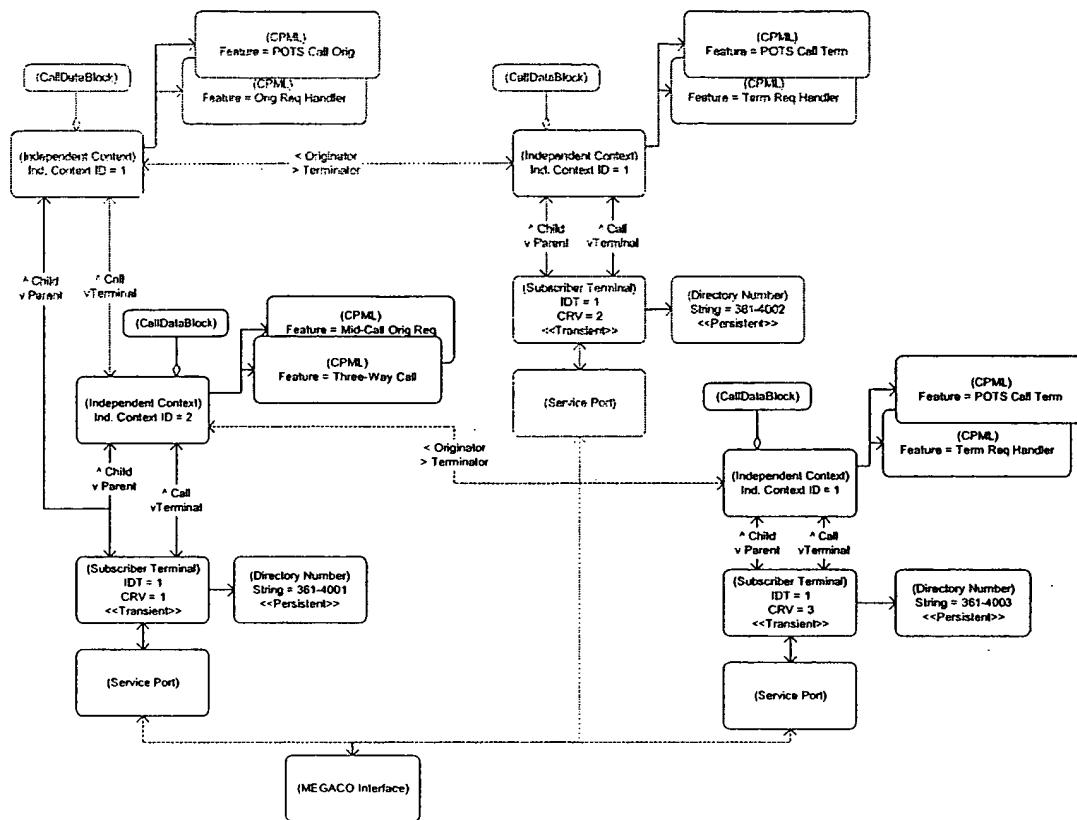
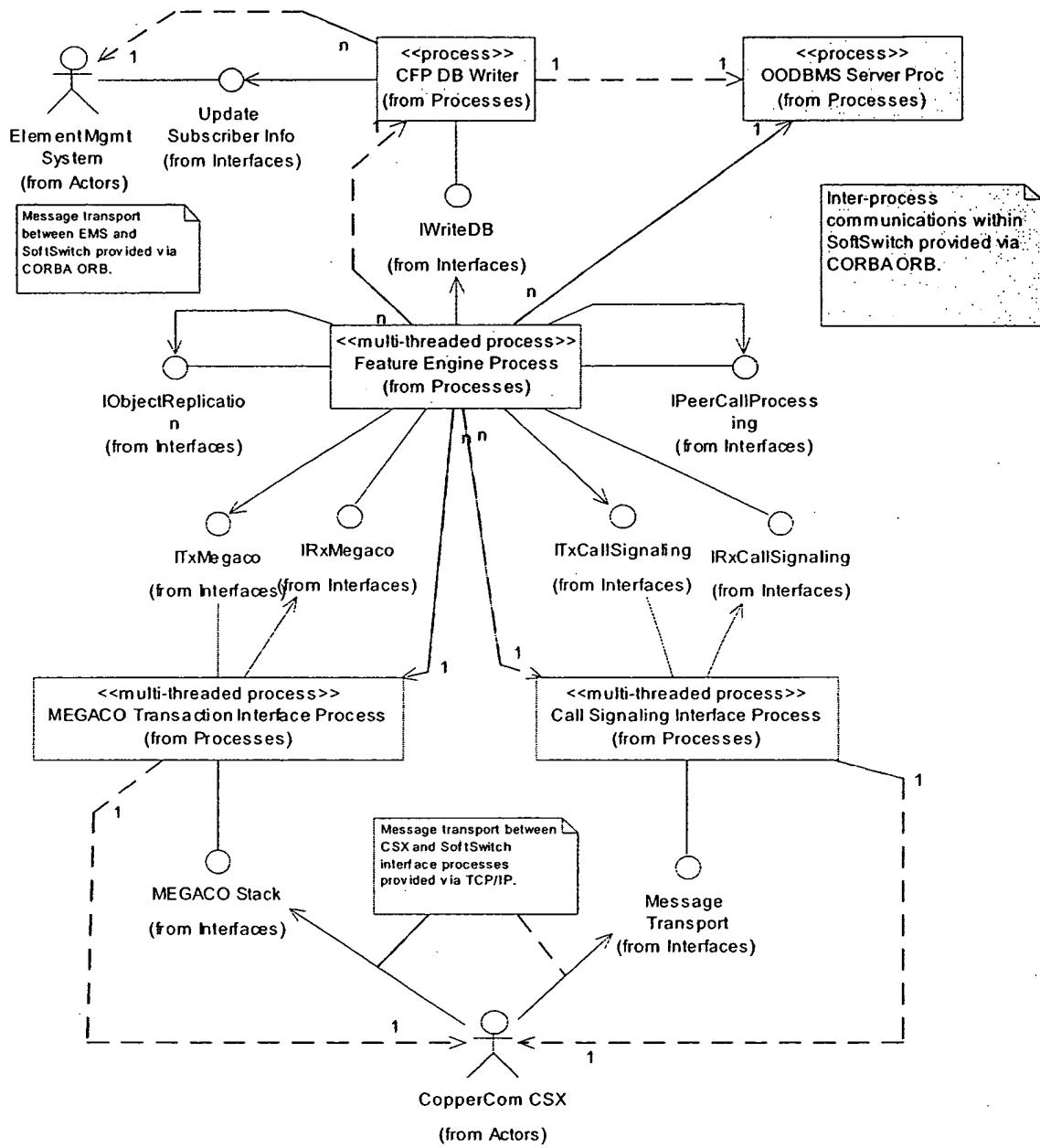


Figure 57



**Figure 58**